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Swift's Automatic Lubricator.

The internal lubrication of steam engines was formerly considered of minor importance as compared with other parts, and by some eccentric individuals has been ignored altogether.

Even at the present time there are a few who in building steam engines make no provision for the admission to the cylinder of any lubricant whatsoever, but depend entirely upon the condensation for lubrication of the wearing surfaces.

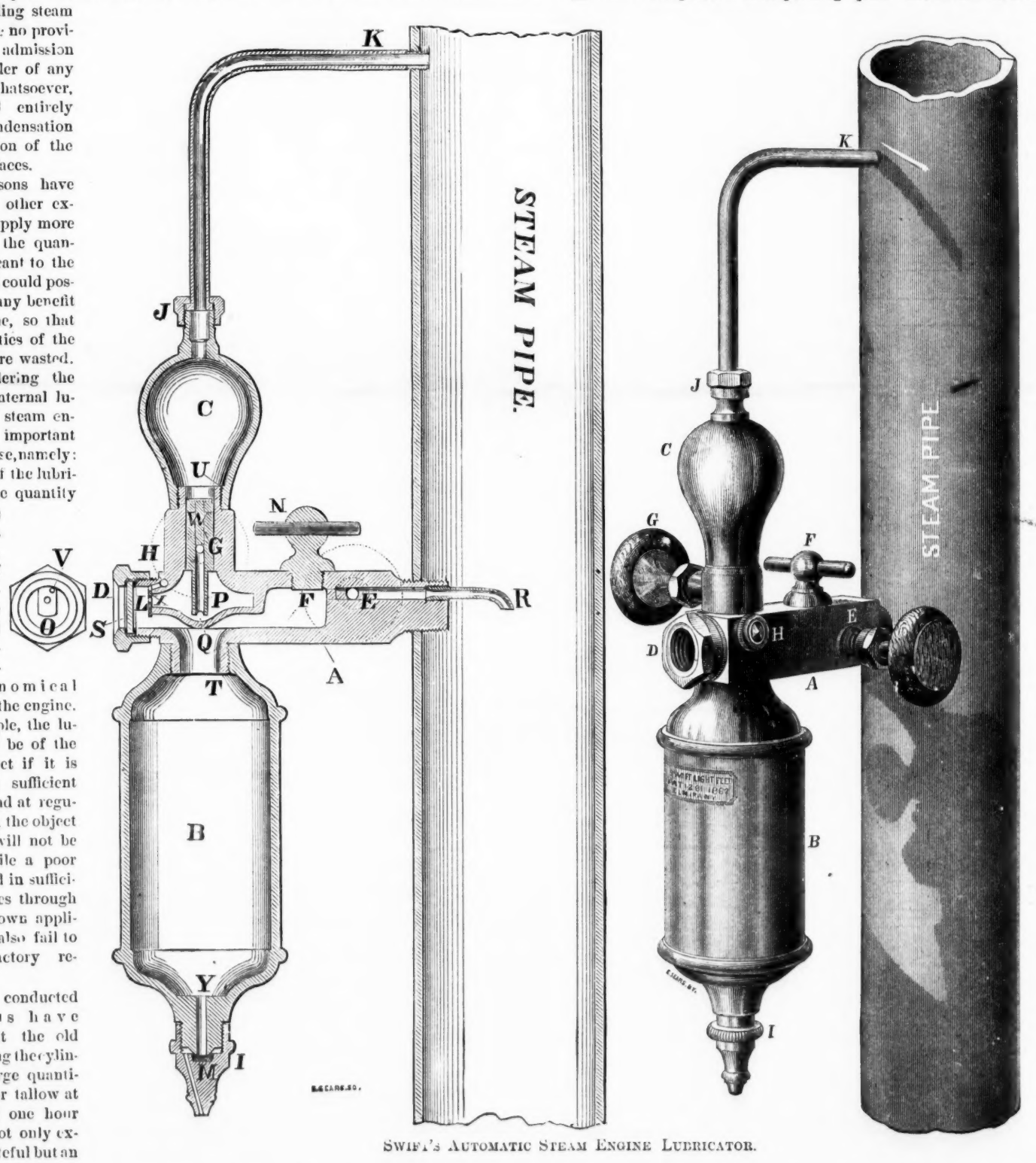
Other persons have gone to the other extreme, and apply more than double the quantity of lubricant to the cylinder that could possibly be of any benefit to the engine, so that large quantities of the lubricant were wasted.

In considering the subject of internal lubrication of steam engines, two important questions arise, namely: the quality of the lubricant, and the quantity fed to the cylinder in a given time. Neither of these questions can be ignored without seriously affecting the economical working of the engine.

For example, the lubricant may be of the very best, yet if it is not fed in sufficient quantities and at regular intervals, the object sought for will not be realized, while a poor lubricant fed in sufficient quantities through the best known appliances, will also fail to give satisfactory results.

Carefully conducted experiments have proved that the old plan of dosing the cylinder with large quantities of oil or tallow at intervals of one hour each, was not only extremely wasteful but an actual detriment to the working of the engine, while it has been conclusively proved that a small quantity of good oil, fed drop by drop, was all that was actually necessary for lubricating well designed and constructed engines.

In changing from the former system to the latter a saving of fuel has always been a noticeable result. In accomplishing all that is desired as a lubricator, it is necessary that the apparatus employed be perfectly reliable and of the simplest possible construction. In detail it must be easily comprehended. The lubricator shown in the accompanying engravings was designed by Allen W. Swift, and is manufactured under his direction by the Elmira Steam Engine Co., at Elmira, N. Y., to fill the above conditions and the manner in which the details are carried out will be readily comprehended. Like letters refer to like parts in the two engravings.



SWIFT'S AUTOMATIC STEAM ENGINE LUBRICATOR.

The perspective view shows the Swift automatic lubricator attached to the steam pipe of a steam engine. It consists of a supporting arm or shank *A*, having a thread at one end by which it is screwed into the steam pipe, while the oil chamber *B* is screwed fast to the other end.

This chamber is cast in one piece of metal and is therefore without joints, except at the top. This lubricator works on the principle of displacement by means of allowing water to flow by its own gravity into the chamber *B*, where it displaces a corresponding quantity of lubricant. This water is supplied from the condensing chamber *C*. Connection is made at an elevated position with the steam pipe and condensing chamber through the pipe *J*.

A water trap is formed in the cavity *P* by a pipe or drip tube *Q*, pendant from the plug *W*, which is closely fitted and retained in its place.

The water falling into the trap flows through the orifice *X* into the oil chamber, causes a corresponding quantity of oil to flow from the chamber *B* through the space *F* and the orifice *R*, where it is carried by the steam to the cylinder.

The bent pipe better allows the oil to atomize, and hence it is better than allowing the oil to drizzle down the internal surface of the pipe for obvious reasons; one of which is, any gummy ingredients contained in the oil will not be liable to be burned or stuck upon the interior of the steam pipe.

The flow of water is controlled by the valve *G*, and the oil is regulated by the valve *E*. The rapidity with which the oil is fed to the cylinder may be observed through the observation port *D*. This port is covered by a plate of glass *S*, securely held in the nut *D*, through which each drop of water may be observed as it passes out of the orifice *X* to the oil chamber *B*. The plate *L* is of highly polished metal, and is better shown at *O*. As the drop of water escapes from the orifice *X*, it momentarily exposes the bright plate, so that the flash can be plainly seen in a clear light a distance of fifty feet, the alternate exposing and covering of the plate, determining the actual quantity of oil being used. The adjustments can be so thoroughly controlled that a single drop may be fed every five to six minutes, or a drop every second, as may be desired. To fill the oil chamber *B*, remove the plug *N*, and open the drain valve *I*, allowing the water of condensation to escape through the passage *Y*. Close the valve *I*, and fill the chamber with oil, replacing the plug *N*. A little air will doubtless remain at the top, which can be seen at the top of the glass *D*. Open the valve *G*, allowing water to enter, filling the space above the oil; then close *G* and open *E* wide, to get full boiler pressure within the cup and leave it open. By opening the valve *H*, the small quantity of air remaining within the cup will escape through the aperture *H*, *V*, shown in the sectional view, after which the cup will be found full of liquid.

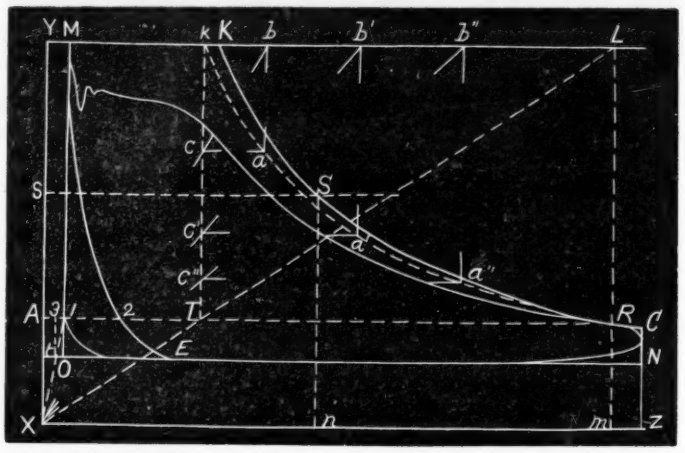
The joints *T*, *U*, are closely fitted, tinned, and screwed together hot—a process called "sweating"—so that these parts, when finally connected, are virtually a single casting. The plug *N* has a metal seat of a soft alloy, while the seat of the drain valve *I* is formed by a disc *M* of the same alloy. When worn, this disc may be easily reversed or finally removed, and a new one substituted. The seat upon the air cock *H* may be renewed by simply heating over a gas-jet or spirit lamp until the alloy melts, flowing together, and again filling the cavity in the end of the stem.

These joints, together with the single casting *B*, and method of putting together, are features peculiar to this lubricator. They are each tested under a steam pressure of 160 pounds per square inch before leaving the works. It will be observed that there are no pipes or complications either inside or outside of this cup; neither are there any glass tubes with doubtful joints, both of which are liable to be broken.

A peculiar feature of this cup is that it indicates to the attendant the necessity of refilling the cup at least one hour before the lubricant is all exhausted. This it does by exhibiting strata of oil and water through the glass *S*, with the oil on top, of course. The bottom of the plate *L* is also exposed continually instead of periodically, as when the cup is full of oil.

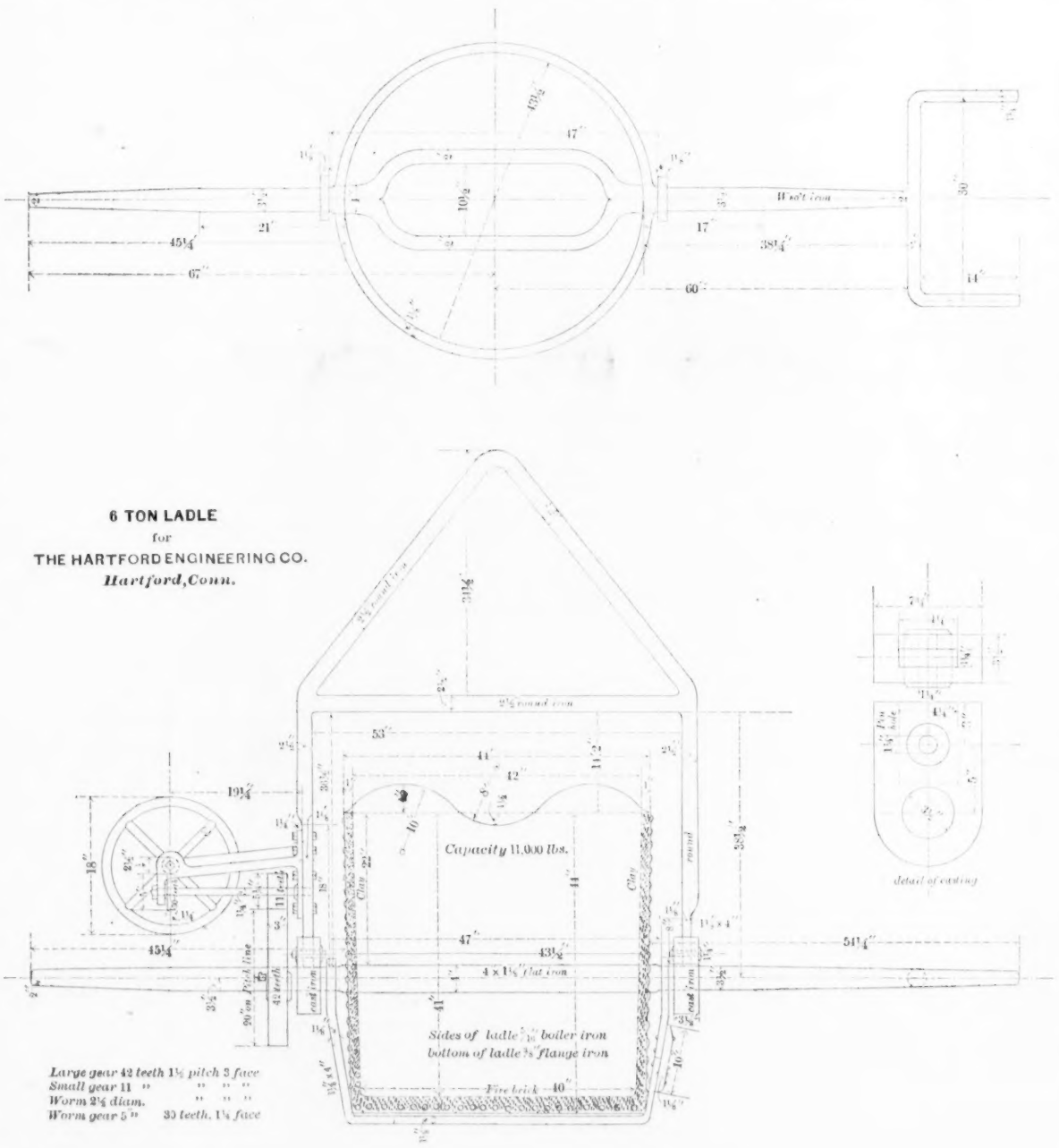
When this lubricator is located in an exposed place, a frost cock is recommended to be placed at *K* to prevent freezing up. At present these lubricators are made in three styles, namely, nickel plated, brass finished, and black japanned. These three styles embrace six different sizes, the smallest capacity being one-third of a pint, while the largest holds one gallon. In the three classes the workmanship and the quality of metal is the same, the only difference being in the external finish. It contains few parts and works well, using either dark or light oils. In the manufacture of these lubricators special tools and gauges are used, so that all parts may be duplicated.

One of the best means of reducing the consumption of coal under or in a steam boiler, is the keeping of a complete daily record of the amount burned. This does not imply that the saving is made by providing a check on the fireman, but rather that it enables him to gauge different manipulations by the exact results obtained; in other words, it affords him a reference of the utmost use to him in educating himself in his duties. Notwithstanding the expense of providing for weighing and recording the coal burned each day is merely nominal, and will not fail in saving ten times the expense, in the majority of instances it is not done.



Mr. Jewett writes: "The advantages of this ladle over the common screw ladle are: it permits the operator to stand in the same relative position when pouring as when pouring with small ladles, permitting him to see the stream and runner, which he, above all others, should see.

"The common worm gear and worm, as used with a ladle, obliges the operator to stand in the rear of his ladle, and his view is obscured by the ladle and by his helpmate, besides he is cramped up in a very uncomfortable position.


6 TON LADLE
for
THE HARTFORD ENGINEERING CO.
Hartford, Conn.
Capacity 11,000 lbs.
detail of casting
Large gear 42 teeth 1½ pitch 3 face
Small gear 11 " " " "
Worm 2½ diam.
Worm gear 5 " 35 teeth, 1¼ face

Six Ton Ladle of the Hartford Engineering Company.

We are indebted to L. C. Jewett, formerly Superintendent of the foundry department of the Hartford Engineering Company, for the drawings from which the engraving of the six ton ladle accompanying this were made. This ladle was constructed while Mr. Jewett was at the works, and we believe it to be a good and handy one for the purpose. The engraving is a reproduction of the working-drawings, and shows the essential features of construction without explanation.

"One very serious objection to worm gearing when applied as it ordinarily is, is the bail or slings expand from the heat, especially if some time is consumed in filling the ladle, the effect of which is to either increase the lost motion, or to make the worm and gear bind so as to cramp the motion. The spur-gear and pinion are not open to these objections.

"It requires but two men to pour this ladle, while it requires three to pour the old style ladle, while the new one is much more easily and satisfactorily, as well as more cheaply operated.

Running the Adiabatic and Isothermal Curves.

BY WM. LEE CHURCH.

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TO RUN THE ADIABATIC CURVE.

The mathematician will recognize the equation of the adiabatic curve to be

$$p \propto \frac{1}{v}^{1\frac{0}{9}}$$

which looks ugly. It merely means that the absolute pressure existing at one point of the stroke during expansion is equal to the tenth power of the ninth root of the volume of the cylinder, including clearance at the point of cut off divided by the tenth power of the ninth root of the corresponding volume at the point of the stroke in question, and multiplied by the absolute pressure at the point of cut-off,—which is a good deal of meaning in small compass. Now the honest fact is, that cube root would throw nine out of ten of us, let alone the ninth root of the tenth power. We will therefore shy right around the above formula, and get at our curve another way.

A table of volumes of steam at different pressures may be found in every engineering work on steam, and these volumes being based on no transmission of heat to or from the steam, *i. e.*, a constant quantity of heat, will at once give us the ordinates of the curve sought, as follows:—

(NOTE:—Any arbitrary unit may be used in measuring the horizontal lines as Ss. KY, etc., which represent the volumes, so that for convenience sake, we will use the same 40 scale for all measurements, remembering that it means *pounds* only when applied to the vertical ordinates.)

Working now upon the actual diagram as shown in cut, take the point of release R, at which the pressure is Rm=23 lbs. as the starting point. What was the volume at any other pressure, say 50 lbs? Draw a horizontal line Ss at a height from XZ equal to that pressure. Remembering that the lengths of the volume lines KY, Ss, RA, etc, are proportional to the tabular volumes of steam at the corresponding pressures, we have the proportion RA : Ss : : vol. Rm, whence

$$Ss = \frac{RA \times \text{vol. Sn}}{\text{vol. Rm.}}$$

All tables of volumes do not exactly agree, and in this calculation we are using the one found on page 400 of Nystrom's Pocket Book. It is well enough to say here that when we say, for instance, vol. Rm = vol. 23 lbs. = 1066.3, we mean simply that a given quantity of steam at 23 lbs. pressure occupies $1066\frac{3}{10}$ times the space which it would occupy, if in the state of water, and a table of volumes is simply a collection of these relative volumes at different pressures. Since RA and vol. Rm are used in the calculation of every point of the curve, we may shorten the work by finding at once the value of

$$\frac{RA}{\text{vol. Rm}} = \frac{122}{1066\,3} = .115$$

and retaining it as a constant. Inserting it in the above formula, we have, Ss = .115 × 508.29 = 58.5 lbs., which we at once lay off from s, giving us the point S of the adiabatic curve. The volume for any other pressure, as the absolute boiler pressure XY=83 lbs., is found by multiplying the constant .115 by the volume for that pressure, thus:—

.115 x 317.2 = 36.5 = KY,

giving K the point of cut-off due to the terminal CZ. This method of running the adiabatic curve is much simpler than any yet promulgated, and is by no means formidable. As, however, a table of volumes is not always at hand, and the process, at best, is not easily memorized, I have little hope that many of my readers will ever trouble the adiabatic curve. So that, after all, the standard which we have been at so much pains to demonstrate, though correct, is too refined for common practice. What, then, shall we do? We have already remarked that the isothermal curve is not widely removed from the adiabatic, and, being a hyperbola, it is very easily run by the following new and much simplified method:

TO RUN THE ISOTHERMAL CURVE.

Through the point of release R, draw the horizontal line RA, and erect the perpendicular R L. ML may be the boiler line or any other convenient line. From L draw the diagonal L X to X, the point of intersection of the clearance and vacuum lines, and where it cuts R A at T, erect the cut-off line T k.

which gives the point k as the point of isothermal cut-off, due to the terminal C Z, as K was the point of adiabatic cut-off.

Next, take any points, b, b′, b″, at random, and draw the diagonals bX, b′X, b″X, and from their intersections c, c′, c″, with T k draw horizontals c a, c′ a′, c″ a″, and the points a, a′, a″, in which they intersect verticals through the corresponding points b, b′, b″, are points on the isothermal curve, and the curve may now be sketched by hand. After practicing this a couple of times it will be easily remembered, and any engineer can thus run the true curve on his diagram in five minutes.

Saunders' Pipe-Threading Machine and Three-jawed Chuck.

We present with this an engraving representing a new pipe-cutting machine, made by D. Saunders' Sons, Yonkers, N.Y. Also engravings representing a new chuck for holding pipe for threading and cutting off, made by the same firm.

The pipe cutting machine is designed especially for jobbing shops which have work sufficient to keep a machine of this class in use the greater part of the time, for which purpose it is of a strong and substantial character, and very conveniently arranged for general and varied use in cutting off and threading pipe from ¼″ to 2″, inclusive. This machine, as previously stated, is a special adaptation of one of their line of pipe-cutting and threading machines, and in other respects does not differ essentially from other machines made by this firm. Solid cutting dies may be used in this machine, if desired, or movable dies, by which running back on the thread is obviated, may be used.

The chuck shown represents an improvement on the three-jawed chuck manufactured by this firm for use with their pipe machines. As formerly constructed, the jaws of this chuck were operated by means of a ball-and-socket attachment to the actuating screw. In the present arrangement the ball and socket have been dispensed with. By reference to the engravings, it will be seen that the chuck consists of an outer shell, Fig. 1, and an inner shell, Fig. 2, arranged so that the latter, guided in the former, can be moved a part of a revolution for the purpose of gripping the pipe. This movement is brought about by means of the screw shown, which works in a steel nut, one of the surfaces of which is fashioned into teeth somewhat similar to the teeth of a gear wheel. This nut is guided in suitable ways in the shell, and engages with teeth in the shell, Fig. 2. By turning the screw in the proper direction, the nut is drawn forward, causing the shells to revolve with reference to each other, bringing the abutting portions in contact with the dogs, forcing them around on the eccentrically-inclined surfaces, and firmly gripping the pipe. A reverse movement of the screw instantly releases the pipe.

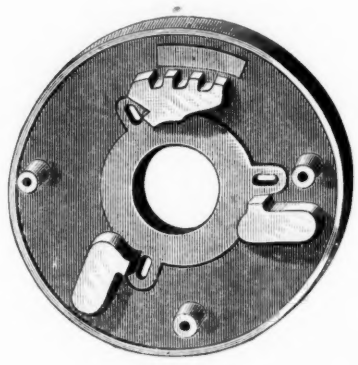


FIG. 2.

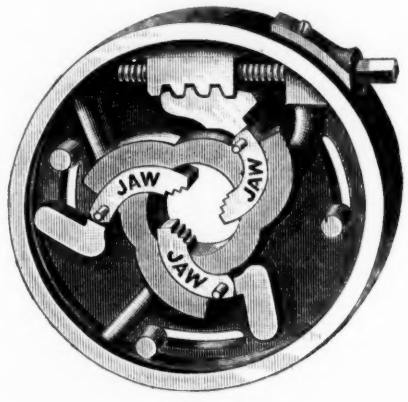
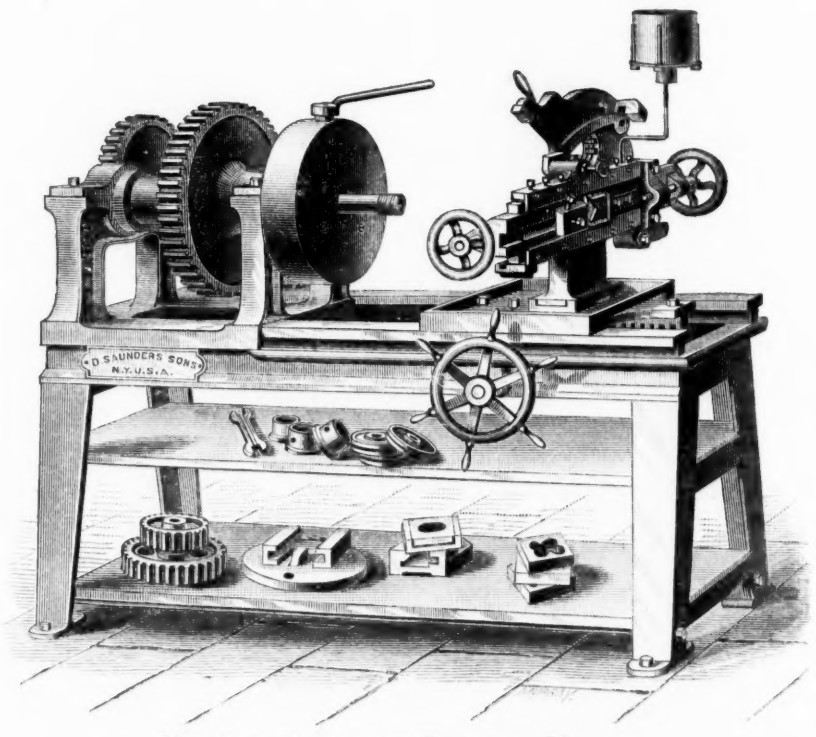


FIG. 1.



NEW PIPE CUTTING AND THREADING MACHINE.

Look Out for the Boilers.

BY LEWIS F. LYNE.

The title of this article may be somewhat startling to some of the readers of the AMERICAN MACHINIST, but that does not change the fact that the latent powers of boilers are not always regarded. In some instances boilers are carelessly neglected, while in others I am safe in saying that there has been willful neglect, and loss of life has been the result. The subject of boiler explosions has been worn threadbare, yet many boiler owners persist in their careless course. The laws, where any exist, in relation to the inspection and care of steam boilers may be regarded in many places as useless, as if they had never been enacted.

Boilers are generally kept in operation as long as they will hold water, while at the same time the owners know full well that they are unsafe. If they do not know it they should make it their business to find out.

It is generally customary, when the growth of a manufacturing or other business requiring steam power increases, beyond the capacity of the original system of furnishing power, to increase the boiler pressure and speed up the engine. This plan may be followed with economy within certain limits, but in many instances within my recollection this has been done once too often, and destruction of property has swiftly followed, attended with loss of life.

When an increase of power becomes necessary, before taking any definite action in the premises, a careful examination should be made of the existing plant to arrive at an intelligent conclusion as to what would be the safest as well as the most economical course to adopt. There is no economy in carrying twenty or thirty pounds more steam and blowing up the boilers, so what sometimes appears the best method of attaining the desired end frequently terminates in disaster. The boilers should be carefully inspected both inside and out, so that the risk of an explosion from an overloaded boiler may be reduced as much as possible.

There are various ways by which the power of an engine can be increased without any increase of the boiler pressure; one is by the application of an independent condensing apparatus in the shape of an independent air-pump or a jet condenser. The jet condenser is probably the most available for small engines, and can often be used where other devices for accomplishing this purpose could not, while upon larger engines the independent air-pump and condensing apparatus are found entirely satisfactory. By applying such apparatus to steam-engines, their power can be increased from fifteen to fifty per cent., depending upon circumstances.

When boilers become old, they should be treated with great care, for boilers, like humanity, are heirs to many diseases, such as grooving, corrosion, oxidation, crystallization and others. If, upon inspection, a boiler reveals any of these evils, they should be attended to at once without delay.

I know of no other reliable way to determine the actual condition of a boiler than to make a careful external and internal examination. In many instances that have come under my observation, boilers have been reported all right, while, at the same time, there were stay-bolts and braces broken, as a subsequent examination proved.

It is a custom upon some lines of steamers, as soon as the vessel is made fast to the pier, to raise the safety-valves and allow the steam to escape, reducing the pressure with wonderful rapidity.

It is not an uncommon occurrence to see the temperature of a boiler of this class changed from twenty to thirty degrees within ten minutes. There are persons in charge of such boilers who will admit the harmfulness of sudden changes in the temperature of boilers, yet will allow these same changes to take place before their eyes, every day.

An experiment was once tried, within my knowledge, upon two locomotives from the same builder and of the same class. One of them was put in charge of an old and experienced engineer, while the other was given to an average engineer. Within a year the locomotive given to the latter had to be taken into the shop to have the flues reset, and to calk the seams in the fire-box, while the other locomotive remained tight. The cause was very simple and readily ascertained. Facts were as follows: The ordinary engineer ran his engine under great variations of feed and steam pressure and a consequent varying temperature. Before putting his engine into the round-house, he pumped up his boiler and let the pressure run down very low. The result was just what might have been expected from the frequent and unequal expansion and contraction of the parts (tubes in particular) causing them to leak badly. The older and more experienced engineer was careful to maintain as near an even pressure as possible, feeding the boiler as fast as the water was evaporated, and he never put his engine into the house with less than one hundred pounds of steam when he could help it. While in the house the pressure was kept up to one hundred pounds and upwards, so that the variations through expansion and contraction of the stays and plates were very slight. As a result, this boiler ran for three years without repairs, nor did leaks then appear. At the expiration of that time this locomotive was taken into the shop for a general overhauling.

There is one principal cause for lack of consideration in the management of steam boilers, and that is that many people do not seem to understand the nature of steam. They seem to look upon it as *pressure* simply, and do not seem to realize what danger there is attending the use of steam as a motive power. Steam is a very useful agent for the promotion of civilization, and is a very obedient servant to man, but there are certain laws to be observed in its management, which, if transgressed, will suddenly transpose this obedient servant into a dreadful enemy. The principal one of the safeguards to be observed is to provide a vessel sufficiently strong to not only hold the pressure required to be carried, but to have a surplus of strength suitable to meet all contingencies. The steam boiler, of all the apparatus and machinery in all establishments, should have the best care, instead of which it is the most neglected. This will always be the case until the proprietors of such establishments are convinced that the boilers must be looked out for, and require periodical inspections to be carefully made and remedies promptly applied, to meet all difficulties as soon as they appear.

Some Handy Things for a Planer.

BY H. NORTON.

Anything that saves time and is convenient would seem desirable, providing it does not unfavorably affect the work produced. This, I think, is true of the following device, which consists of four stops: two at the ends of a planer table, and the other two placed to suit the length of work in hand. These are beveled so that the dog will pass them in one direction, but not in the other. The dog must slide out and in at right angles to the length of the table. Now, if the operator wishes to run out the table to examine his work, or for any other purpose, he will pull out the dog on the return stroke (a spring must be arranged to carry it back to place again). Then, when he starts his machine, he can either reverse it himself or let it run to the end stop, when it will reverse itself, come back to the working stops, and go on as before. This avoids much changing of stops, and is very convenient.

This device may not be entirely new, but most planers now in use do not have it, and I am confident that all intelligent planer hands would prize it very much after using it a while.

Another good thing is a graduated hub to the cross screw, reading to thousandths of an inch, or anything less. This is indispensable on some jobs—cutting a rack, for instance—and handy on a great many jobs. I would also have the upright feed screw in the head arranged in the same way.

Another convenient and time-saving device would be to have the cross-beam loosened, and fastened by a single lever—if it can be done—and held firmly. Such a device should not be adopted at the expense of stiffness. But the other devices cannot in any way affect the good working of the planer.

I am glad to see one of your correspondents advocate a three-legged planer—small planers, of course—that stand on floors, &c. It would save some leveling up, and some twisting of beds, &c. You may be sure three legs would look bad, but they would serve all practical purposes, which is the great thing. A seven-foot lathe bed, of medium weight, with strong cross-ribs about every fourteen inches, was found to spring perceptibly of its own weight. No one would think of making a surface plate with four legs, or points of support.

Hints on Drilling Holes to Match Others.

BY GEO. B. FOOTE.

Not long since, I saw Jones fitting a new part in place of an old one which had been broken. He had drilled the bolt holes in the new part as nearly in the correct places as he could measure for them, to match the holes which had been tapped. Of course some of the holes were about $\frac{1}{8}$" and others perhaps $\frac{1}{16}$"out of place ($\frac{1}{8}$"is a hair's breadth with Jones). He then went at it with a round file and filed out the holes, one on this side and another on that, until he could get the bolts somewhere near entering, then forced them in by main strength, called it "good enough," and let it go.

I, for one, never did like a "good enough" mechanic. They are altogether too numerous in this world, even in this age of progress. They usually take twice as long to do a botched, gump wedge job, as it would take to do the work properly, and when they get through, and have as nearly ruined the machine in hand as it is possible to do, they say, "well, it is good enough, it won't do to spend any more time on it." This is true in regard to the question of time, for if they should spend any more time on the job they would probably spoil the machine beyond redemption.

I am a believer in the old adage, that any thing which is worth doing at all, is worth doing well.

The original part which Jones was replacing with a new one, had been drilled and reamed, and the bolts had been turned to fit the reamed holes. It would have been a comparatively easy matter for Jones to have transferred the position of the tapped holes to the new piece, and to have drilled the holes to match very closely, if he had known how to do it; but as he did not, he had to adopt a crude system of triangulations with an old worn out, loose-jointed pocket rule, and a clumsy, blunt and dull prick punch.

I have not written this article for the benefit of those who already know how to do such work as the correct reproduction of holes, when work is to be drilled and bolted together, but for the benefit of those who do not, and I will give a few hints on doing that kind of work, which may benefit some of your readers who now do it in Jones' way. Referring to the sketch, Fig. 1:

Let *A* represent a new piece to be fitted and bolted to the piece *B*, in which the holes 1, 2, 3, and 4 have been drilled and tapped, and holes to match, 1′, 2′, 3 and 4′ have to be drilled in the piece *A*. Smear a light coat of lamp-black and oil, red lead, or black lead, around the edges of the holes 1, 2, 3, and 4; then take a piece of thin, smooth paper, *C*, and place smoothly on the piece *B*, over the holes, fastening it in position with a little beeswax on the edges, which should be waxed by placing the paper on a warm, flat piece of metal, rubbing the edges or corners with a piece of wax. After the paper has been fastened in position, place upon it the piece *A*, which should be brought into its correct position and clamped. Then, with a sharp-pointed No. 5 pencil, mark around the piece *A* on the paper; remove the piece *A*, and rub around the holes 1, 2, 3, and 4, so as to print their position on the bottom of the paper. Remove the paper from *B*, and wax the top in the manner before described for the bottom; place it upon *A* in the position as marked with the pencil, fasten it down with the wax and prick-punch around the holes indicated on the paper, and drill in the usual way, with a drill slightly larger than the size of the body of the bolt.

Should it be required that the body of the bolt should fit snugly the holes in *A*, then use a drill somewhat smaller than the required size; make two or three studs of steel, cutting the threads so as to fit firmly into the tapped holes in *B* (see Fig. 2), turning the projecting portion down, as shown at 3. Bolt the pieces together with bolts which have had their bodies turned down, as shown at 1 and 4. Adjust the piece *A* in its true place, screw down the bolts 1 and 4, and bore out the holes 2 and 3 to the required size with a hollow rose-bit, the hole in which fits over the steel studs, as shown in section at 2. Screw out the studs 2 and 3, and the bolts 1 and 4, which replace with the studs. Bolt the parts together with the permanent bolts and proceed as before.

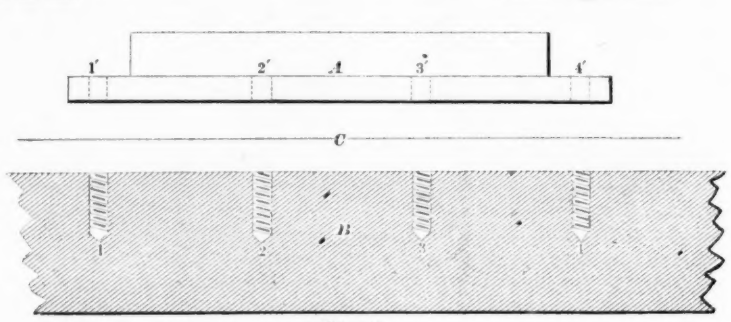


Fig. 1

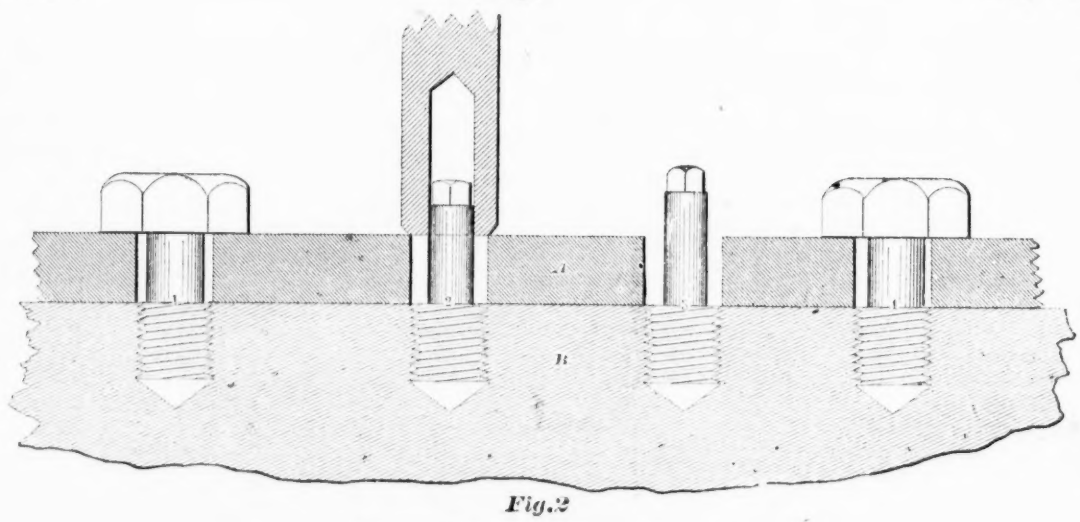


Fig. 2

DRILLING HOLES TO MATCH OTHERS.

The expression "slide-valve engine" has done duty until its usefulness is substantially exhausted; that is, until it fails to express what it was intended to express, viz., an engine with a flat slide without a cut-off. In point of fact, a flat slide valve of some kind has come into more common use with automatic engines than, perhaps, any other form of valve; and, if the expression is still to do duty, the custom of a few, who always qualify it by prefixing the word "plain," should become universal. Perhaps even then the expression is open to the objection of not being very exact, but, as it will convey the meaning in a way to be understood, which is, after all, the principal point of importance, no serious objection is likely to be taken to its use.

Philadelphia Engineers' Meeting.

At the November 4th meeting of the Philadelphia Engineers' Club, Mr. John Haug, in presenting the Club with a copy of Lloyd's Rules for Iron Ships, stated the number and tonnage of ships built in Great Britain in 1881 as follows:

BUILT IN 1881. LOST IN 1881.

	NUMBER.	TONNAGE.	MATERIAL USED.	NUMBER.	TONNAGE
Steel Steamers.....	34	63,366	32,000 tons.	1	1,536
Steel Sailing Vessels....	3	3,167	1,500 tons.		
Iron Steamers.....	411	590,503	300,000 tons.	139	138,370
Iron Sailing Vessels....	50	68,650	34,000 tons.	52	43,936
Wooden Steamers.....	30	1,659		18	1,704
Wooden Sailing Vessels	259	16,448		821	168,579
Total.....	787	748,793		1031	354,125

The principal changes in the rules for 1882 have been in water-tight bulkheads, of which more are now required in longer and larger vessels, and they are to be extended to the principal upper deck.

Vessels of extreme proportions (over 11 depths in length) have to be better strengthened in their top and bottom members, by doubling strokes, etc.

Treble riveted buttstraps are required to a greater extent, as forming stronger joints.

The rules for boilers, machinery, pumping arrangements, spare parts for machinery, etc., have been extended and improved, with a view to greater safety at sea.

As shipbuilding of steel is increasing, a reduction of 20 per cent. from the scantlings required for iron is permitted, giving ships so much more carrying capacity. A complete set of rules for testing all materials, insures uniform quality in steel used. Steel castings, by the Siemens-Martin or Bessemer process are also now used, in place of large and expensive forgings, for stemports, rudders, stems, etc., and they have been found strong and tough; they are less expensive than scrap-iron forgings, and the risk of bad welds and inconvenience of rough and uneven shape is avoided.

The latest circular issued by Lloyd's Register offers to fix a proper load line for each vessel, according to its style, form, etc., thus the rules not only provide for its proper strength, but also its sea-going qualities, etc. This is of the greatest importance, in view of the many disasters that have occurred from the want of those qualities.

Recent trials in London show that, at an average, the gas consumers gets no more than one-half the light that could be had from approved burners. Electric lighting will, of course, find itself in competition with the more approved forms of gas-lighting.

A Berlin inventor makes a footstep bearing for an upright shaft as follows: The shaft is made a good fit in the bearing, which is slightly tapered. In the end of the shaft is a steel stud, which bears on the bottom plate of the bearing, and over a cavity in that plate. Oil or other liquid is forced by a pump into this cavity at a pressure sufficient to slightly raise the shaft, and the lubricant, escaping up the sides, returns to the pump.

A Defective Apprentice System.

A few weeks ago a paper was read before the Commercial Club of Cincinnati, on "A Defective Apprentice System and its Results." We make some extracts which give expression to facts we have often stated:

"The time when the head and the heart worked with the hand in an honest day's labor intelligently performed is past. In these later days we have introduced machinery, and with the machine we put a man who *was* a workman; now he is an operative; in half a century he will be an automaton. Manufacture-making by hand, has we mean, passed away; the business of the workman is to stand by the machine." The author has evidently overlooked the fact that it requires, in most cases, a certain degree of skill to run even a machine. However, "the trouble is," says the writer, "that manufacturers and machinery, by traveling beyond their proper place of action, have destroyed art by taking it out of the hand of the individual, and have either given it to many workmen acting successively—and so destroying each other's work and individual impression both manually and mentally—or they have put the work wholly and passively into the power of a machine. The artistic faculty in a man can find expression only through himself and through his own mind and head, and it is only by the constant expression of the artistic faculty that a man grows and waxes strong. Curb the expression, crush it out, and the man dwarfs and finally dies. It is only by the alliance of the workman with his work that good work is secured."

It is possibly true that a very large percentage, as the writer says, of the mechanics who have learned their trades in the past fifteen years are incapable of doing the work which their predecessors did, that comparatively few of our best mechanics are American born; and that where there are *five* applicants of *foreign* parentage to learn a trade, there will not be *one* whose parents are Americans by birth.

Now, why is this? Formerly it was an exception when an American boy did not learn a trade; now it is the rule. There are several reasons: First and foremost, the American boy does not want to learn a trade. Too many of them are ashamed to perform manual labor; they delight in fine linen, gorgeous apparel and a life in the counting room, or in the dry goods store. No matter if the boy crowds out some poor girl who is better fitted than he to sell tape and pins, there he stays on a girl's salary, preferring that position to one which would bring him more money, better appetite and digestion, well earned repose, and a feeling of manly independence, which can never come to him where he is. To remedy this, let there be made a deliberate effort to crush out the feeling of false pride in our boys, and to extol the dignity of labor.

Not all American boys feel so, however. Fathers see that there is not the opportunity given boys to learn which there was thirty years ago, and they put them into other pursuits—regretfully, in many instances, for there are many parents who recognize the value to a man of the knowledge of a trade.

Another reason is in the objection of parents to the associations which will surround their sons during their apprenticeship. While we do not believe that these are as demoralizing as many suppose, still we admit the fact that there is some ground for the fear, and we appreciate the parents' anxiety for the morals of the boy. There is one thing that may be relied upon, however, that if the boy is at home in the evenings, the ten hours per day in the workshop or building will not hurt him seriously. It is the night work which undermines the moral constitution, and therein the old apprentice system, with its absorption of the apprentice into the family, was a good thing.

In this age a new system of teaching must be sought, and that, we think, is to be found in technical schools.

When England went to the Paris Exposition of 1867 she was astonished. When the awards were made she was paralyzed. With few exceptions, the prizes which had heretofore been easily carried off by English manufacturers were turned over to France, Germany, and Saxony. Make all the excuses possible of non-representation, &c., and still the candid Englishman had to admit that he had been beaten in his strongest point. Not only was his pride touched, but there was an unpleasant feeling about his pocket as well. It was evident that no time was to be lost. The School's Inquiry Commission was directed to report relative to technical education. A committee of the Council of the Society of Arts selected a number of artizans to visit the Exposition and report.

The English Commissioners and jurors were interviewed, and all the information possible obtained regarding the causes of the decline of English manufactures, or the advance of those of the other countries.

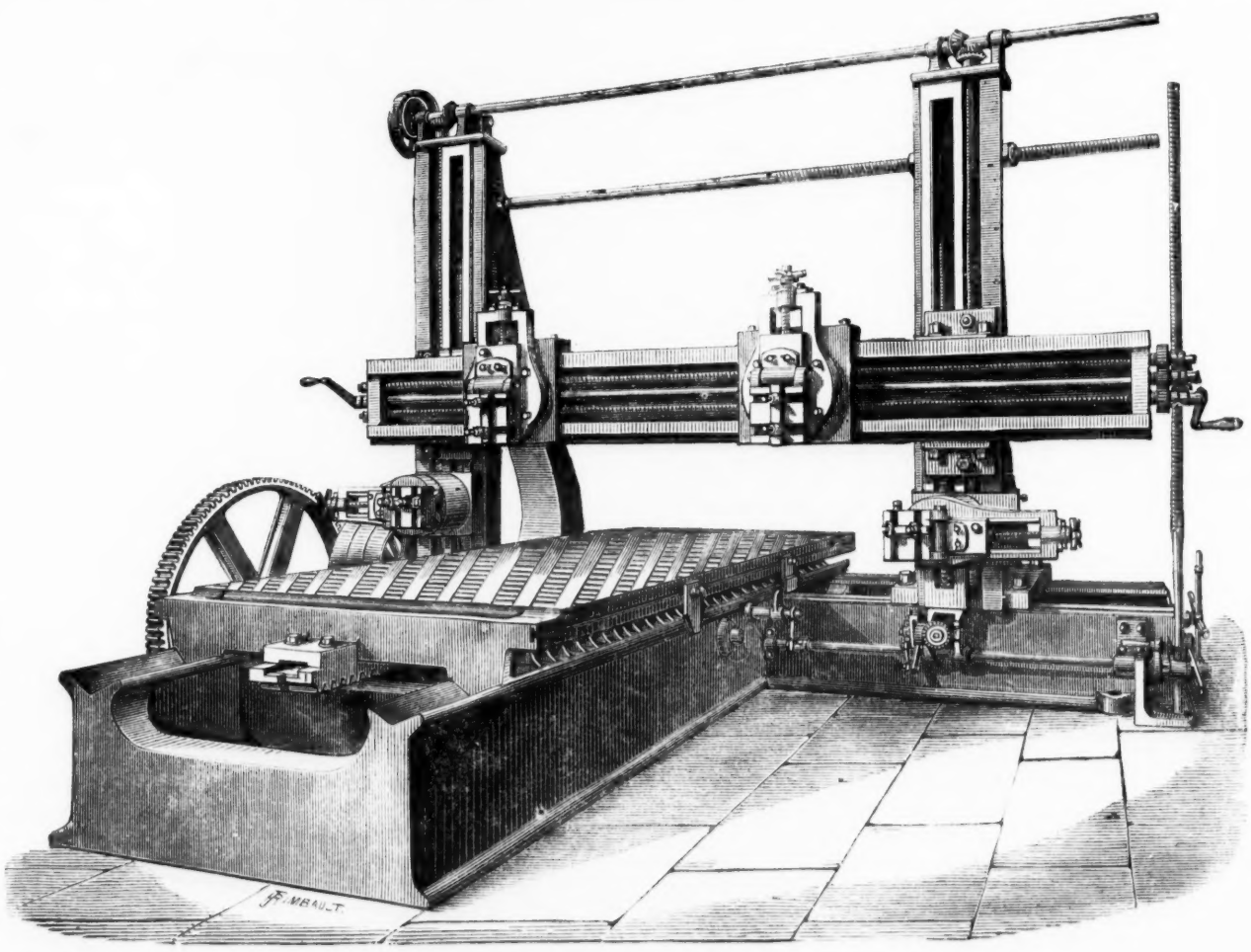
One of the jurors was Dr. Lyon Playfair. He says: "I am sorry to say that, with very few exceptions, a singular accordance of opinion prevailed that our country had shown little inventiveness, and made but little progress in the peaceful arts of industry since 1862.

"Deficient representation in some of the industries might have accounted for this judgment against us, but when we find that out of ninety classes there are scarcely a dozen in which pre-eminence is unhesitatingly awarded to us, this plea must be abandoned.

"My opinion is worthy only of the confidence which might be supposed to attach to my knowledge of the chemical arts. But when I found some of our chief mechanical and civil engineers lamenting the want of progress in their industries, and pointing to the wonderful advances which other nations are making, when I found our chemical, and even textile manufacturers uttering similar complaints, I naturally devoted attention to elicit their views as to the causes. So far as I could gather them by conversation, the one cause upon which there was the most unanimity of conviction is, that France, Prussia, Belgium, and Switzerland possess good systems of industrial education, and that England possesses none."

An English Iron Planer.

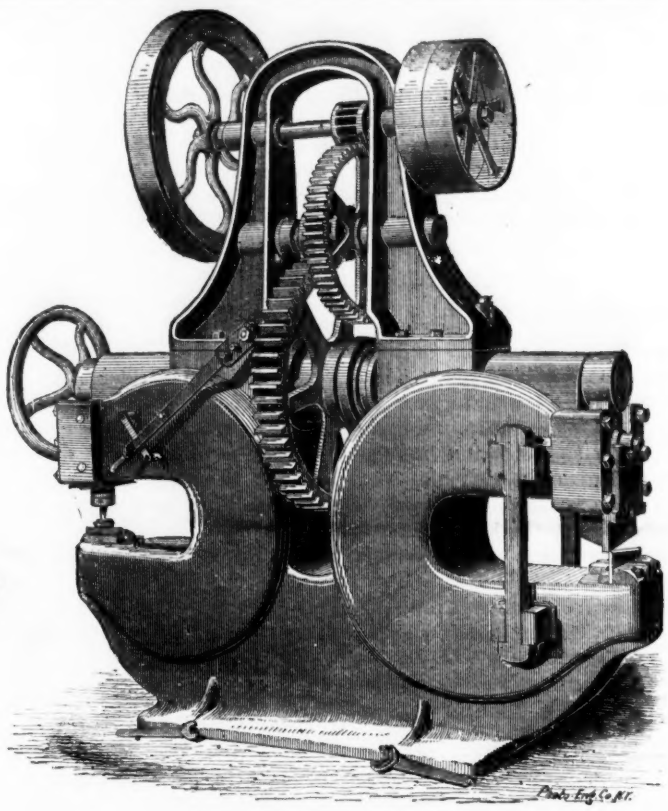
For the illustration of the iron planer, shown on this page, we are indebted to the courtesy of *Engineering*. The planer was manufactured by Francis Berry & Sons, of Sowerby Bridge, England. The machine was specially designed to suit the requirements of marine engineers, and, as will be noticed, is made with one fixed and one movable standard; the latter being adjustable to suit the varying work to be operated upon.



AN ENGLISH IRON PLANER.

The machine weighs 35 tons, and will plane (when closed up) 14 feet long, 8 feet wide, and 7 feet 6 inches high, and it will open out to 12 feet wide. The two tool-boxes on the cross-slide are self-acting in the vertical, horizontal, and angular cuts, but those on each upright are self-acting in the vertical feed only. It will thus be seen that all the tools can be brought up to the work and be in operation at the same time, which is a very great advantage in the class of work for which the machine is intended.

The machine has been supplied to Northern Marine Engineering Co. (limited), Gateshead-on-Tyne.



COMBINED PUNCH AND SHEAR.

Combined Punch and Shear.

The accompanying engraving represents a combined punch and shear, made at the Lambertville, Iron Works, Lambertville, N. J. This machine is designed for general boiler work, railroad, and bridge work, &c. It will punch and shear to the center of a 44 inch sheet, punching a hole $\frac{7}{8}$" diameter through $\frac{7}{8}$" iron, and shearing bars $\frac{3}{4}$" × 4½".

The punch and shear can be run separately or together, as desired. This end is accomplished by parting the eccentric shaft, either or both ends of which can be clutched with the main driving gear. The eccentric shaft is 5⅝" in diameter.

The punch slides are long, and the punch has a stroke of 1½". By the use of the hand-wheel the punch can be readily adjusted as required. Any size of punch up to 1¼" can be used. The shear can be placed lengthwise or crosswise of the frame, as desired.

The frame is heavy, and the machine is strongly geared and driven by a 4" belt, traveling 125 feet to each stroke of the punch or shear. The machine is complete in itself, with countershaft attached. The total weight of this machine, as constructed, is 10,000 lbs.

Some Points About Indicators.

At the last meeting of the Society of Mechanical Engineers, J. Burkitt Webb presented some ideas with reference to a new form of steam-engine indicator which he had devised. Mr. Webb illustrated the wavy form of diagrams taken with the instruments at present in use, from which he argued that the principle of their construction and operation was wrong. He described his manner of correcting this as follows: Supposing that at any particular part of the vertical stroke of the indicator piston we can stop it and wait until the next stroke, when we will allow it to go on a short distance and stop it again, and wait for the succeeding stroke, and allow it to succeed. If we can make the parts exceedingly light, so as to act quickly, we can then get a perfect diagram. He said that he designed to make the diagrams all a certain length and of a certain height, so that the form of the diagram can be carried in the eye, or one can be laid over the other, and the changes of form seen. He was also endeavoring to get rid entirely of springs in the indicator; he thought that could be accomplished and the moving parts made lighter. That was a question, however, of experiment.

In the discussion following the presentation of the subject by Mr. Webb, Mr. Emery spoke of the difficulties he had experienced in using, in the navy, the McNaught indicator, when he used to hold a block of wood so that the piston would strike it, and by this means get a very fair diagram. He said his experience would hardly warrant trying to get cards of the same height. Young gentlemen who take diagrams try to get in a light spring, so as to give the diagram a pretty good height. I have always insisted they should keep in a 40 spring for anything and everything, no matter whether there is 20 pounds of steam or 100. At once the card becomes an indication to the eye of the mean pressure of the cylinder; and, if a 40 spring is ever accurate at any pressure, it is just as accurate at 20 pounds pressure as it is at 80. I think, as one who has taken thousands and thousands of cards in my younger days, that perhaps the suggestion would come with at least some force as to the length. Many are apt to get cards too long, whereas, by allowing a little more leeway for stretch of string, they get a card which will keep its place; but that is a matter which does not affect the present case.

MR. HOLLOWAY:—I would like to ask the Professor what would be the effect if the engine has a variable load—variable to a great extent, as it has to be in some instances—what kind of a card would it make, working at full stroke part of the time and at quarter stroke part of the time?

MR. WEBB:—By taking such a card, the curves generally join and form a continuous curve; but I apprehend the object of taking a card is to take it under certain conditions of the engine. In such cases I have blocked it and set it at a given point. With reference to the remarks made by Mr. Emery, I agree with him entirely. The length and height of the cards is only fancy perhaps, although there is something more in the height of the cards than I have mentioned. With reference to the pencil running directly up, that is the point that was alluded to in this indicator as unfavorable. It multiplied six times; that is very unfavorable. In this form, there is no reason why the spring should not be a long spring and have a large amount of motion. There is no advantage gained in restricting the spring.

Long evenings admonish the boys to clean up and put to use their drawing instruments.

LETTERS FROM PRACTICAL MEN.

Leading Nut and Screw for Engine Lathes.

Editor American Machinist:

An article in your issue of November 18 mentions, among other things, an arrangement by which the leading nut of a screw-lathe may be worked upon any portion of the screw without regard to the position of the tool-carriage. The annexed delineations illustrate this device:

The part marked *a* represents a portion of the front side of the bed of a lathe; *b*, the apron; *c*, the screw; *d*, the leading nut, and *e*, the rod which carries the cams that open and close the nut. This rod also serves to propel the carriage when the nut is used outside the apron, as shown. The position of the nut when in its place within the apron is indicated by dotted lines. When worked in this position the nut is locked to the collar of a screw thimble, seen at *f*, which locking is effected by giving the handle *h*, half a turn. When the nut is worked outside the apron it is locked to the rod *e* by the set screw and collar *g*, and the carriage is locked to the rod by the carriage *i*, as shown. The arrangement is best seen in the cross-section, at the point *z*, in Fig. 4. It is designed that the leading screw *c*, shall be made of two-inch stock, for medium-sized lathes, and that the thread shall not be finer than thirty to the foot; the thread to be formed according to the best style of gear-teeth, so as to serve as a rack for moving the carriage by hand by the handle *s*.

F. G. WOODWARD.

Running a Rattler.

Editor American Machinist:

The first machine that I had the responsibility of running, when I went to learn the machinist's trade, was the rattler, for cleaning small castings and obtaining the shot iron from the residuum of the cupola.

In time I learned to distribute the weight of castings, and adjust the larger pieces to prevent packing, and fill up with the cupola debris.

One day the belt, or band, as I called it, did not work well; it jumped and slipped, and nearly came off the pulley. I did not know what to do, nor what was the matter, and I determined not to be below the standing given me by others.

In cleaning up the shop and helping around, I saw the men change machine belts from one speed to another, and I rather liked to see a machine speed along, and determined to run the rattler faster.

The pulley was on the end of the shaft, and I found a smaller pulley that would fit, put it on and shortened up the belt.

The next day some castings were wanted in haste. I put them in and started up the rattler. How still it run! Not a rattle, except what came from the shaking of the very foundation of things.

I shut off quickly, and lost no time in getting the old pulley back to its place.

I was devoting some of my evening hours to the study of natural philosophy, and when I had learned something of centrifugal force, and its effect upon the gravity of bodies in motion, the rattler again became an object of interest, and I found that a velocity of 180 feet per minute at the periphery, would let the loose material fall, and do good work.

Q. K.

A "Constant" Source of Trouble.

Editor American Machinist:

In a recent issue of the AMERICAN MACHINIST I notice a "New Table of Indicated Horse Power," in which I became quite interested. I took the first example and tried it to see how it would pan out, but somehow I can't make it come out to my satisfaction; therefore I want to ask Mr. Hammett if he will kindly rise and explain how he gets that constant of 10.279?

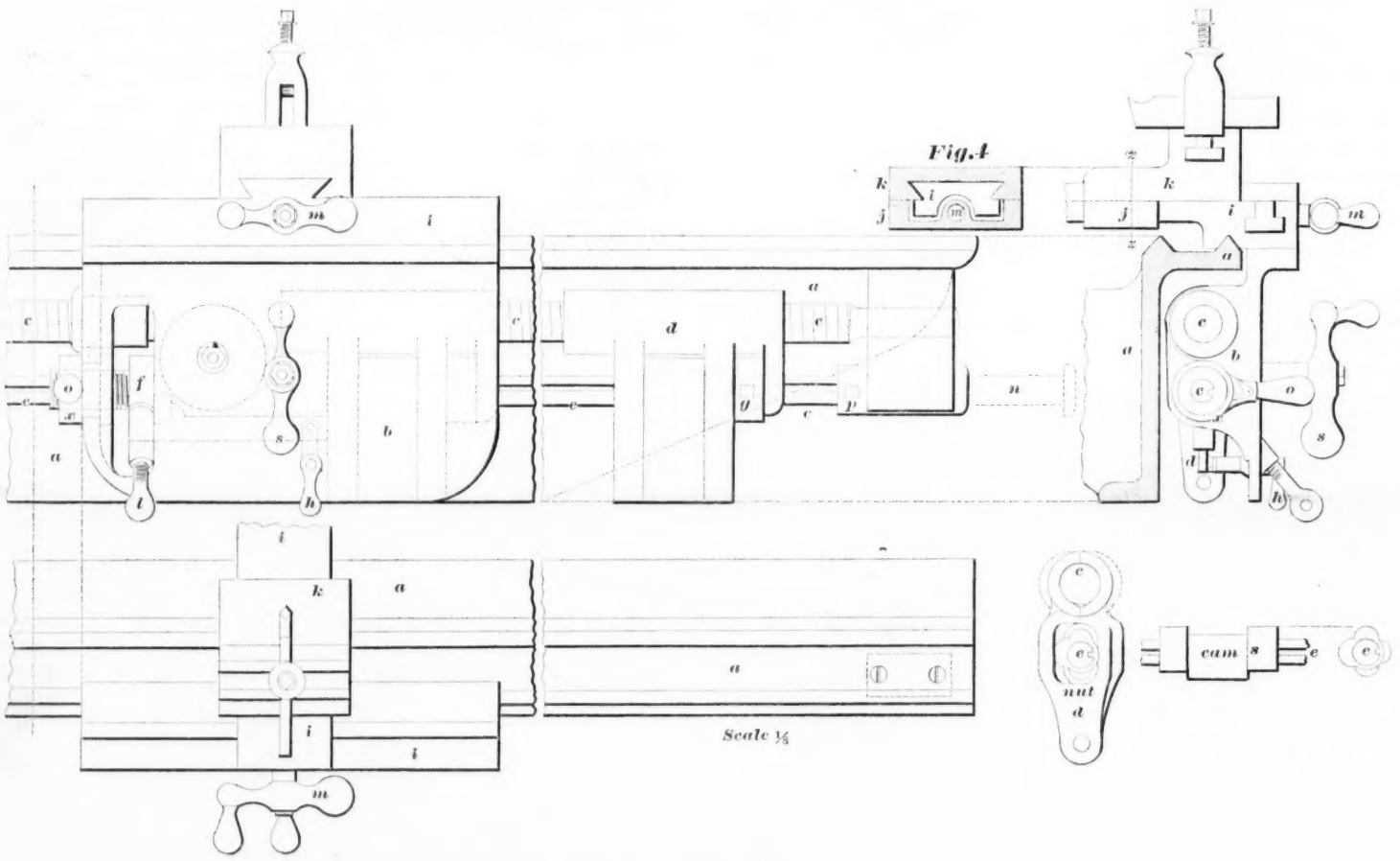
You may remember that when I was an "occasional correspondent" I also submitted a table of factors for determining the horse power of the steam engine (I forget whether or not you published it), and by the method I used that constant of 10.279 as given, would work out 10.138, then $10.138 \times 40 = 404.52$ horse power, a difference of 5.68 horse power.

Now some people may think this a very small matter to write about, but then some small matters cause a large amount of trouble at times, as for instance, a too close contact with the business end of a lively wasp, or taking the wrong road when one is in a hurry to get to a journey's end. This little matter of 5.68 horse power troubles me so that I fear I shall never be entirely happy again until I learn how Mr. Hammett gets his table of constants, what kind of an engine he figures from, etc.

Having had sufficient experience, in my younger days, to know the value of good tables of constants in helping a man out of trouble when he has a trifle too much work to do, in the time allotted to do it, I know it is highly important that we shall improve every opportunity to become better informed. This is the object of

W. H. ODELL.

Syracuse, N. Y.



set screw *l*. This set screw is formed, as shown, to serve as a handle for working the cam-rod *e*.

The reader will perceive that when the nut is used outside the apron, the rod *e* must, of course, move endwise with the nut and carriage, and that their range is limited to short work, not exceeding the length of the head-stock of the lathe, unless the rod *e* is made longer than the bed of the lathe.

When the nut is used within the apron the carriage is of course free to move the entire range of the machine, and the rod *e* is held from moving endwise by the set screw and collar *p*. The handle *e* works the nut *x* in either direction, by means of a double pawl, as shown, and this nut works the screw-thimble *f*, which has a range of about ¾ inch. The object of this device is to set the tool instantly at work, or to give the tool carriage any desired fractional movement independent of the leading screw *c*. For instance, when the tool is brought exactly to the point to commence cutting, and the leading nut will not close, a few movements of the handle *l*, will suffice to bring the threads of the nut and screw to coincide.

Another good feature is seen in this arrangement: The recess for the cross-feed screw *m*, is in the lower side of the carriage *i*, instead of the upper side, as is usual, so that the screw is completely out of reach of chips and dirt which fall from the work. The nut *i* takes hold of the tool-block *k*, outside the and stood looking at it, when a voice behind me said, "Why don't you take up that belt, and not stand there gaping at it?"

I had no idea of what it was to "take up a belt"; I had never heard of such a thing before, and was more bewildered than ever.

The Old Man, (for it was he who had spoken) threw off the belt, unlaced it, cut out a piece, punched new holes, and then said: "This is the way to lace a belt: begin in the middle and work towards the edge; cross the strings outside, returning to the middle and leave off there; fasten the ends, by drawing tight through the belt." He suited his actions to the words, and finished with pulling the strings through tight, then run on the belt with a jerk, and said, "Now learn to see things about your work, and attend to them, and not wait to be told, or for some one else to do them. That belt would have been taken up before now, if we had to send up town for a harness maker every time a belt was to be sewed."

I thought that the lecture and the lesson were not quite consistent with each other, but I remembered both, and I do not now know of any better way to lace a belt, and I have thought of the harness-maker in every shop that I ever worked in. I have also seen it expected of boys, that they should know things far beyond their teaching and experience.

The lecture had its flattering aspect in seeming to credit me with more than I knew,

Mr. Hammett's Table of Horse Power Constants Criticised.

Editor American Machinist:

On examining Mr. Hammett's "New Table of Indicated Horse Power," I find it to be incorrect. The horse power constant for a 22″ cylinder at 650 feet piston speed ought to be 7.487, instead of 7.486, as he gives it, and a 60″ cylinder at 750 foot piston speed 64.26, instead of 64.245. But aside from this I claim these are not the correct horse power constants, as they will give a higher rate of indicated horse power than an engine with cylinder and piston speed of either dimensions will develope, as the total area of the piston is taken without reference to the diameter of the piston rod. Where the piston rod passes through both ends of the cylinder the whole area of the rod should be deducted from the area of the piston, and where it passes through one end half the area should be deducted, to get the mean area of both ends.

For example, what is the horse power of an engine with a cylinder 60″ diameter and 6.5″ piston rod, with a piston speed of 750 feet per minute, whose diagram measures 40 lbs. mean effective pressure? We have for area of piston, 2827.44, which, minus half the area of the piston rod = 2810.848. This multiplied by 750 = 2108136 cubic inches piston displacement; $2108136 \div 33.000 = 63.882$, the horse power constant; $63.882 \times 40 = 2555.28$ horse power. If we take 64.26 for the horse power constant, that is without deducting half the area of the piston rod, we would have 2570.4 horse power, which is 15.12 horse power more than the actual power could be.

A. BANNATYNE.

Steam Engine Economy Practically Considered.

Editor American Machinist:

In your issue of Nov. 11th, I endeavored to show how one class of steam engine users bought and cared for their engines. In this I will relate how purchaser No. 2 buys his engine and boiler, and how he has it taken care of. He goes to the same engine builders that the other purchaser did, and gets an engine of the same size—100 horse power. He tells the firm that he

wants one of their best engines and boilers. He does not care so much for the first cost, but it is the daily cost he is looking after, and that he wants reduced to the lowest figure. He finally agrees to take one of their best engines, and the proprietors of the establishment guarantee that the engine shall furnish the full amount of power required, and on a consumption of less than three lbs. of coal per hour per horse power.

His next inquiry is for a good, steady, practical engineer; one capable of erecting and taking charge of an engine and boiler. He gets his engine, and hires his engineer, and when the engine arrives at his mill the engineer's time commences.

His engine is placed on a firm, strong foundation, and when it is bolted down it is there to stay, and the engineer knows it. The engine is set level and square every way. The boiler is set in its place with the same accuracy and painstaking as the engine was. The engineer examines it inside and out before starting his fire. If there is any old hats or bunches of oily waste left in the boiler by the boiler makers, he finds them and takes them out. They are small things, yet they may ruin a boiler in a short time. He sees that the gauge cocks are in the right place, for instances have been known where, when water would show in abundance at the bottom gauge, yet the tubes and crown sheet would be bare and dry.

Special attention has also been paid to the draught, and the fire-room is large enough for the convenient handling of fuel, ashes, &c., and he takes care that there is room enough in front of his boiler to run a slice bar through his fires, or a rod through his tubes, without being obliged to use some of the kind with two or three joints in them so that they can be doubled up like a jack-knife.

When he gets everything ready he informs the proprietors that they can start up their works in the morning, and when morning comes she runs, not any way, or some way, but right.

He is furnished a man to do the firing, take care of fuel and ashes, and to help about the engine when called upon to do so. If some parts of the engine seem to warm up (and new work is very apt to do so), he attends to it at once. When he puts oil on the engine, he puts a little just where he wants it, and none is wasted. His engine is kept bright and clean, and engine room, is entirely separate from fire-room, and is kept clean and neat. He takes pride in his engine, and when visitors call they are sure to be shown into the engine room by the proprietors. If there is the slightest noise, like a squeak or a thump, or any noise unusual about the engine, he is there to hear it and stop it.

After the engine has been running a few days, at the request of the builders the indicator is applied, and they find that the engine furnishes all the power guaranteed by the makers, and on a consumption of less than three lbs. of coal per I. H. P. per hour. Not only the makers, but the owners of the engine are very much pleased at the result of the test. The engineer now knows how much coal it takes per day to run the engine, and he takes care that the fireman does not use any more. If he hears steam wasting through the safety valve, or finds the furnace door standing wide open, he knows it is wasting fuel, and has it stopped at once.

One of the very best and most useful appliance for the economical use of fuel about an engine and boiler is a good steady fireman.

The difference in coal consumption between these two engines, per day of 10 hours, is 5,000 lbs. Purchaser No. 1 gets only 80 horse power and uses 8,000 pounds of coal per day, while purchaser No. 2 gets his full 100-horse power from 3,000 lbs. of coal per day.

Some one may say these are extreme cases. They are not; for the writer knows of engines running that use more than 10 lbs. of coal per hour per horse power, and also engines that are running on less than three lbs. of coal per hour per horse power. There are a great many causes that will produce such a wide difference in coal consumption, even in engines calculated to develop an equal amount of power.

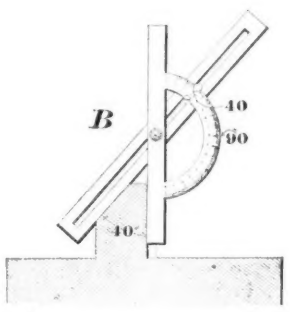
Corning, N. Y. STARTING BAR.

Graduations on Planer Heads and Bevel Protractors.

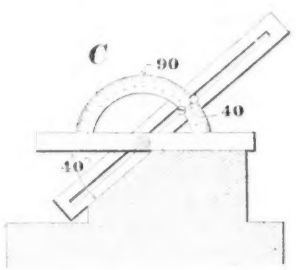
Editor American Machinist:

In your issue of October 21, I noticed, and, as you also remark, Willis Hanaford has opened up an old question. He says he thinks the 90° graduation on planer heads should be on the side; or in other words, the horizontal planer (or platen) should represent base line or starting point, and recognize the tool-head feed as at right angles to the platen, or 90°. This is undoubtedly the correct plan, and, if we had never had any graduations on planer heads, and a maker was to adopt it, he would probably say, "We work from the platen! Our head feed is at right angles to it; we will mark it 90° when perpendicular, for it seems more mechanical to work from a real than an imaginary line." That would be my argument, though all makers, as far as I know, mark 0 at the perpendicular.

Let's suppose we start a man on a planer, with instructions to plane bevel edge on cast-



ing from sketch *B*. He sets head over to 40°, and accomplishes what we want. We tell him to clean off bevel of next piece from sketch *C*. He sets head over, as before;



finds something wrong; draughtsman has made a mistake, sure. What's to be done? Some "old vet" comes along, and tells him to "set his head over to 50°, and it will come out all right;" so he finds out after cursing the maker of the planer. Now, suppose we had a planer marked with the new (?) idea (with 90° on side), he finds he has got to set head at 50° to get 40° on sketch *B*. Now, it's this maker's turn to be cursed. He starts on *C*, and finds it all right. After all is said, we find the principal trouble was in the man. *A little study on a man's part will soon convince him that he can't be floored on a bevel, if marked either from the horizontal or perpendicular.* It's possible that planer makers don't want to send out a planer without a zero mark somewhere, yet by the new (?) method of marking there would be none, as there is only room enough for about 45 graduations (calling one to a degree) on any of the modern planers. Ordinarily, this is sufficient; if not, an expert planer hand knows how to set over to get any degree or fraction from 0 to 90°.

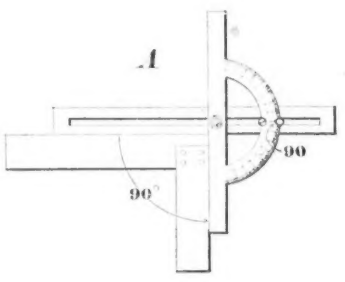
It seems to me we ought to hear from some representative of the following planer makers in regard to the head marking: Sellers, Bement, Pond, Pratt & Whitney, Whitcomb or Hendey; and there are others I don't call to mind who build these tools. They must have their opinion in regard to it. Let's have it!

Let's look at the criticism in November 18th issue, of Willis Hanaford, by "M. C. K.," of Providence. He says, "he has worked at iron planing fourteen years, and *was therefore amused* by his (Willis Hanaford's) letter." I have talked with a number of intelligent planer hands, who were willing to look at the matter squarely, but all failed to see the joke. He also claims that the "fault lies in most draughtsmen and makers of bevel protractors."

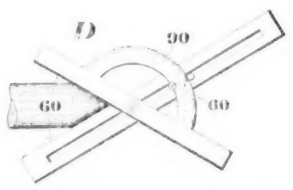
Neither a drawing nor a bevel protractor could influence a planer hand in setting the head over.

Drawings are not supposed to be marked in reference to the casting's position on the planer. He states that "they both work from the horizontal line." *This is an error.* It is optional with the draughtsman which to use. See sketch *B*, figured from the perpendicular, and sketch *C*, from the horizontal.

Now, we will take up the "bevel protractor" (a tool that stands A1 in any toolmaker's kit). The graduations on a bevel protractor head have nothing to do with horizontals or perpendiculars. They are graduated from the inside edge of the head (or, rather, on a line through center of pivot parallel with inside edge), and marked correctly, with 90° on top of half circle, and

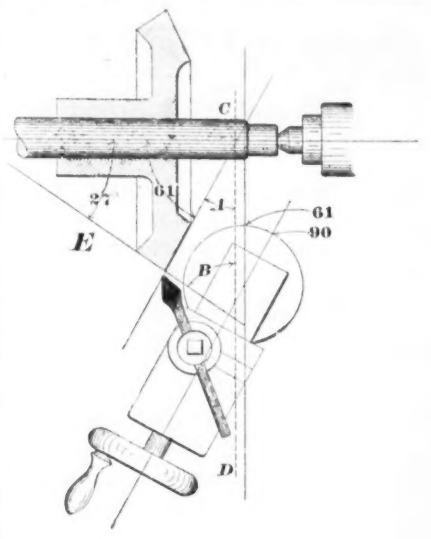


when placed on a square, as per sketch *A*, would denote the blade 90° from beam. Placed on piece, as per sketch *B*, we read 40°; also, on *C*, we read 40°. Placed on lathe center, as per *D*, we read 60°. This



illustrates the design of the tool. In regard to the reflection on "our model machine shop," I presume this means the Brown & Sharpe Manufacturing Co., they being the only makers of bevel protractors in this city (or in this country, as far as I know). Wishing to know the circumstances in regard to this, I looked the matter up, so am prepared to make a statement. Brown & Sharpe did just such a job, or, rather, graduated two heads for bevel protractors lately. They received the job from one of the workmen, with verbal instructions to graduate and mark "same as their regular protractor." The job—which, by the by, was supposed to have been for him personally—was done gratuitously. There evidently was a misunderstanding between "M. C. K." and the middle man. Brown & Sharpe did as they were instructed, and should, under any circumstances, carry out the orders as received. The protractor they make is correctly marked, as I have shown, but they have no prejudice in the matter. Figures would be placed anywhere, or left off entirely, *if so ordered*, or they would stamp with Chinese or Egyptian characters, or hieroglyphics of any kind, which it is possible to accomplish with the best facilities of the times.

Trusting this is sufficient to eradicate any wrong impression which any person may have formed from reading "M. C. K.'s" communication, I will return to the graduated arc or circle. Speaking of numbers on such circle graduations, I must remark that what is correct for one tool would not necessarily be for another. For instance, the graduated head on a T square should be numbered as "M. C. K." proposes for a bevel protractor, as the blade is the base or working line. Again, the 90° graduation on a compound rest for engine lathes should represent to feed at right angles with spindle, for in turning angles on bevel gears, as per



sketch *E*. Thus the numbers on compound rest correspond with angles of face and edge of gear from its axis. Suppose we reverse this, and call 0 where 90° is now placed; then we are obliged to read for face 42, and for edge 46, which necessitates marking drawing at *A*, *B*, from line *C*, *D*, which is an imaginary line.

I trust we will have more correspondence in regard to this matter from other volunteers, provided it is done with an idea of exchanging opinions with but a single motive—that of deriving mutual benefit.

Providence, R. I. GEO. H. SMITH.

How Iron Filings Prevent the Use of the Electric Light.

A case wherein the electric light and small particles of iron and steel are the central figures of attraction has lately come to light in this city. A manufacturer who employs a large number of emery wheels in his works concluded that he ought to have an electric light, and the light was accordingly put in. To his great disappointment he found that it would not work, and as an explanation for its queer conduct, was informed that the light was all right, but the atmosphere of the shop was all wrong—there were too many iron and steel filings "a flying in the air." After several ineffectual efforts to make the light perform its functions properly, it was suggested that the generator might be "boxed" and the obnoxious filings kept at a distance. This plan was tried, but without favorable result. The generator got hot, and petitioned very forcibly and effectually for a few whiffs of fresh air. This ended the struggle and the light was taken out. The real cause of the light's failure, as we have intimated, was not due to any imperfections of its own, as it is now working satisfactorily at another shop, but is ascribable to the large amount of iron and steel filings and dust in the air of the shop in which it was so fruitlessly experimented with. The rapid travel of the armature of the generator created a suction in the air, and this, added to the magnetism of the field magnets, naturally drew all iron filings floating in the air toward and into the machine. These small particles, attaching themselves to the armature strips, were brought in contact with the electric sparks of the machine and heated sufficiently to burn out the sections of the armature. The loss of one section, of course, breaks the circuit and puts an end to further operation. Several sections were burned out in the experiments to which we allude and the folly of persisting fully demonstrated. The question now is, can the electric light be successfully employed in close proximity to emery wheels?—*Age of Steel.*

Modern machine shop practice has succeeded in dispelling the mechanical illusion that two things that are made alike are not alike. Nothing was more common among mechanics a few years ago than the argument that two steam engines made precisely the same, would give quite different results under the same management. Common sense, aided by the skill to mechanically reproduce the details of machinery, has effectually answered this argument.

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☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen, and all those especially interested in the occupations we represent, on subjects pertaining to machinery.*

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NEW YORK, DEC. 16, 1882.

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Our Prospects for 1883.

At this time of year winter overcoats and newspaper prospectuses come into extensive use. Upon close observation we find a few changes in styles in the former, but have not been able to discern any new fashions in the latter. The winter overcoat, is without question, regarded as a necessity in a rigorous climate like ours, but an impression is gaining ground that even if the annual newspaper prospectus does not make its appearance in the household or in the shop, no serious privations will necessarily follow. We confess to sharing somewhat in that impression ourselves, and have, therefore, refrained from exciting the imaginations of our readers (who, as a class, are not likely to be carried away from established facts upon the wings of imagination), by inflicting upon them a column or two of the usual platitudes of a prospectus. We do not believe that they would appreciate the AMERICAN MACHINIST any more highly if we should open up in the time-honored style: "During the coming year we shall publish a number of new and original articles (or series of articles) prepared by authors of wide reputation, etc."

Then might follow the stereotyped declaration: "Its circulation is constantly increasing and there is every reason to believe that it will be larger next year than ever before." If there ever was any copyright upon the following part of the regular prospectus it has certainly expired: "This journal will not only maintain those features of excellence which have hitherto made it sought for wherever a reliable journal is wanted, but will add other features of importance that will make it worth many times its subscription price." The model prospectus should of course wind up with some allusion to the marked abilities and special knowledge of its editorial staff.

We shall omit our prospectus until the fashions in that line undergo a change. Suffice it to say that the AMERICAN MACHINIST will be published fifty-two times during the year 1883, and that we have no change of policy to present or discuss.

While we are willing to take whatever credit belongs to us, we are not egotistical enough to believe that the unexampled success of the AMERICAN MACHINIST is to be attributed to the mere personal skill, either mechanical or journalistic, of its conductors but that this success is in a large measure due to the hearty co-operation of its great constituency of readers. No firm or company, no matter how much mechanical knowledge may reside in the individual craniums of its members, can create a leading journal representing the machinery and engineering interests upon any such self-contained resources.

Without attracting the free and willing co-operation of the great fraternity of American mechanics, the weakness of such an attempt could not be concealed. It affords us the greatest satisfaction to know, through voluntary expressions of our readers by letter and otherwise, that we still maintain, not only the confidence and support so generously accorded to us at the outset, five years ago, but steadily expanding and strengthening favor and encouragement that give ample assurance of continued success. To our readers, one and all, we must say we are grateful for your efforts in aiding us to build up the AMERICAN MACHINIST to *a weekly paid circulation greater than that of any other strictly mechanical or engineering journal in the world*. We can only judge the future by the past. The AMERICAN MACHINIST for 1883 will be what your continued co-operation with our efforts shall make it.

We have recently received several orders for the AMERICAN MACHINIST containing an article by Wm. Lee Church, in which the manner of drawing the theoretical curve on indicator diagrams is illustrated and described. As the reserve copies of that issue are exhausted, we reproduce in this issue so much of the article as relates specially to the subject, believing it will be of general interest to our readers and at the same time serve the purpose of those who have ordered the issue referred to.

Collateral Steam Engineering.

In steam engineering, for the past few years, attention has been to such an extent directed to the steam engine, that the collateral branches, that is the branches that are a part of, or so intimately connected with, steam engineering, as to belong to the establishment or the keeping up of the motive plant, are almost entirely neglected. Even the boiler, really the first objective point, is not unfrequently neglected, and a steam engine provided, which returns a horse power for the least practical quantity of steam, but which is supplied from boilers of very low efficiency. The results of such one-sided engineering—poorer economy than would result from the use of an ordinary engine with better boilers—so far from being exceptional, are so common as to excite but little attention, the economy of the engine being taken, apparently, as sufficient to cover the sins of omission with reference to the boiler. It may be cited as one of the anomalies of steam engineering that the boiler and engine are seldom thought of in the same connection, and never in their natural order. It seems a slow process, the arriving at the fact that where fuel economy is one of the ends sought, the boiler is the first thing to be considered.

Or the boilers and engine may both be good, but the distribution of power, through ully-arranged lines of shaftings, perhaps half of them useless, may consume so much of the power in friction as to make anything approaching economy out of the question. The distribution of the power is really one of the weakest parts of the engineering pertaining to the establishment of a motive plant. In many instances, the expense of substituting a more economical type of engine is incurred when a much greater saving could be effected by a little attention to matters entirely outside the engine; such matters as rearranging to throw out of use worse than useless lines of shafting, bringing to proper size and speed necessary lines, and providing for their running with less friction. Not that the change of engines may not be proper and in every way desirable, but that the whole matter is allowed to begin and stop at the engine.

If the modern steam engine shows more than the regulation loss in friction, only by four or five horse-power in a hundred, the matter—properly enough—will be investigated at once, but five times this amount will be wasted between the engine and the work without exciting any special notice.

In some instances where a change is made in the engine for the sake of better economy, other changes are at the same time made, which are so far the reverse of economical that all the gain is more than neutralized. We remember an instance of this kind, where an engine that had been doing duty for perhaps twenty years was replaced, for the sake of economy, by another of more modern construction. With all work on, the old engine indicated only 80 horse power, but to cover a probable addition the new engine was of 100 horse power. At the time of making the change in engines the opportunity was taken to extensively re-arrange the machinery, shafting, &c. When the new engine was started it was found rather small for the work, requiring the boiler pressure to be kept well up to the limit, which was in turn a matter of considerable difficulty, as the boiler had, apparently, grown small. Upon applying the indicator the new engine was found to indicate 110 horse power, doing exactly the same useful work as the old one. That is, 30 horse power of work had, in the re-arrangement, been wasted between the power and the work. When a little more work was added, no more than the old engine would have done, the engine was found to be too small to do it with regularity, and the boiler too small to furnish steam. Now nothing would seem more natural than looking for the loss where it was known to be—between the engine and the work—but instead of this a condenser was added to the engine, notwithstanding the cost of water made its use poor economy. Finally another boiler was added and the engine has been run for some years at an expense materially greater than the cost would have been if the plant had not been disturbed.

We by no means reason that too much attention is likely to be given to the engine, either in the selection or in its future care, but that in both these respects it is too likely to be taken as the conclusion instead of the beginning, or rather the middle, of motive economy. A point has been reached in the knowledge of steam engineering when, between the best builders, but a very slight difference in the performance of two engines need be expected; but, owing to inattention to other matters of equal importance, a difference of fifty per cent. in economy as between the coal burned and the useful work done in two instances, is by no means uncommon. The moral is, not to pay less attention to the engine, but to pay more attention to matters each side of the engine. The true economy of a motive plant must always be looked for beyond the power developed by the engine, that is, in the product turned out, whatever it may be. A poor or a poorly managed boiler may easily annul the best intentions of the steam engine builder, and the machinery intervening between the engine and the work may even more easily waste the economy of both boiler and engine.

These matters pertaining to the economy of the motive plant, which have an importance entirely beyond the consideration usually accorded them, and which are outside the possibility of engine performance, are largely in the hands of the practical men in charge of steam power, and the newly organized Society of Stationary Engineers will be likely to find considerable scope for future action in these directions. A sensible remark of one of the members of that society is, that those in charge of steam-power furnish facts connected with the performance of the plant, covering specifically the relation of the useful work done in the manufactory, that is the quantity of the product, to the fuel consumed in doing it. The dissemination of such knowledge cannot fail in being of great value to the members of the society, in increasing their knowledge and hence their usefulness, as well as to manufacturers and others.

A Pair of Appropriators.

Mechanical Engineering, a pretentious English publication of recent origin, appropriates without the formality of credit, the illustration of a ten ton ladle which appeared in the AMERICAN MACHINIST of July 8, 1882, from the drawings of Thomas D. West, and used in connection with an article from his pen. The engraving is enlarged so as to cover a full page, and generally speaking, is fairly well copied. The curious blunder is made, however, of copying with the engraving of the ladle, and as a part of it, another cut which appeared immediately under it, which was used to illustrate another part of the subject which Mr. West was discussing, but which had about as much connection with the ladle as had the cupola in which the iron was melted.

We trust the readers of the publication referred to will not have as much difficulty, in trying to make one harmonious whole of two distinct illustrations, as the astute editor evidently has had.

While on this subject, even at the expense of appearing hypercritical, we venture to advise our contemporary that, when appropriating the substance of our articles, as was done in the same issue in which the ladle appears, in the instance of "Righting Defective Castings" (Straightening Crooked Castings,) by Thomas D West, AMERICAN MACHINIST, August 5, 1882, when cuts are referred to as "our upper engraving" and "our lower engraving," it is better, or at least customary, to have them appear some-

where in the paper. Appropriating the engravings, as well as the text, should not be allowed to stand in the way of success.

A more cleverly performed job is one by a monthly sheet, published in Chicago, calling itself the *Railway Purchasing Agent*, which transfers the whole of Professor Robinson's article on Bearings and Lubricants, from our issue of November 18th, to its columns, *verbatim et literatim*, without credit. Seldom do we find a more pronounced example of literary piracy. If some sort of international copyright could be proposed by which such publications should be required to steal only from each other, it would present strong claims for confidence and adoption.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

(448) H. A. S., Charlotte, Maine, asks: Are caloric engines as durable and as little liable to get out of order (or nearly so) as a steam engine and boiler? *A.*—No.

(449) P. B. C., Newark, N. J., writes: I send you a cut of a hot air draft, and would like to ask if its use is injurious to a boiler? *A.*—The cut referred to represents a steam jet pipe in the ash pit under the grate. It is a device that has been in use for some time, and we have never seen nor heard of any injurious results from its use. We should not hesitate to use it from any fear of its doing injury.

(450) J. D., Akron, Ohio, writes: Suppose I have a boiler 26″ diameter and 36″ high, with 52, 1¾″ tubes; fire-box 22″ diameter and 13″ high. 1. Will it run a 4″×4½″ engine? *A.*—The boiler would be too small for the engine at full power. 2. How large a propeller wheel should I use for a boat 23 feet long and 5 feet beam? *A.*—20″ diameter and 38″ pitch. 3 What speed could I get from the above arrangement? *A.*—Probably about 6 or 7 miles per hour.

(451) J. H., Mill Village, N. S., asks: 1. What is the greatest known power transmitted by a belt, and what is the width of belt and diameter of pulley? *A.*—We cannot say. 2. Are both the back and front tube heads of horizontal tubular boilers counted as heating surface? *A.*—The heating surface in the heads of such boilers is hardly worth considering. Some engineers take no account of it, while others reckon all the surface of the heads with which the products of combustion come in contact, of course deducting the area of the tube openings.

(452) J. P. B., San Francisco, Cal., asks: 1. What is the correct and simple method of moulders for measuring the capacity of ladles used? *A.*—Different moulders have different methods Our method would be based on the fact that a cubic inch of iron weighs, approximately, ¼ of a pound; hence, by finding the capacity of the ladle in cubic inches and dividing it by 4 a very near approximation near enough for all practical purposes—would be arrived at. For instance, to find the capacity of a ladle 2 feet diameter and 2 feet in depth inside the lining; the area of a 24″ circle is (omitting fractions) 452″ which, multiplied by the depth (24″) gives 10,848 cubic inches capacity. This divided by 4 gives 2,712 as the capacity in pounds; or say a 2,500 pound ladle. If the sides of the ladle are not straight, the average diameter must be found. 2. What is the best known method of mixing plaster Paris, and its treatment, to make false sides or bed? *A.*—Perhaps some of our readers who have experience in the use of plaster Paris for this purpose, will give J. P. B. the benefit of that experience.

(453) W. H., Dayton, Ohio, writes: I am running an engine 8″x16″ at 135 revolutions per minute. The boiler is 42″ diameter and 9½ feet long, with 19 tubes 4″ diameter, full length of boiler. The fire-box is 48″ wide and 38″ long. I want to ask: 1. If I narrow my fire-box will it save fuel? *A.*—If you are running the engine at its full capacity at that speed we do not think you will save any fuel by reducing the grate surface. If you are running quite light, you may save fuel by that means In other words, if you are not already burning less than about 6 pounds of coal per hour per square foot of grate surface, the probability is that you will not effect a saving by reducing the grate surface. 2 Is sal soda good for removing and preventing scale in a boiler, and if so, how should I use it? *A.*—In some instances soda has been found to answer a good purpose. It depends much upon the nature of the deposit. We should commence by putting say, 2 pounds of soda in the boiler at the beginning of the week, and clean out and observe results at the close of the week. If you experience no trouble from foaming, you can increase the quantity up to 3 or 4 pounds. In a short time you will be able to determine whether its use is beneficial or not.

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The American Standard of Bolts and Nuts, recommended by the Franklin Institute in 1864. Adopted by United States Navy in 1868. Price. $1.00. E. Lyman, C. E., New Haven, Conn.

Jas. F. Hotchkiss, 84 John st., N. Y.: send me your *free* book entitled "How to Keep Boilers Clean," containing useful information for steam users and engineers. [Mention this paper.]

L. V. Conover, Iron Founder, 336 to 340 East 29th Street, New York. Heavy and Fine Castings of Iron, Brass, Composition and Copper made to order at shortest notice.

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Boiler Shop Tools.—Patent Bending Rolls, Boiler Plate Planers, Combined Punch and Shears, Single Punches or Shears of short or very long reach, Horizontal Flange Punches, Double or Single Bar Iron Shears, Radial Drills. Send to Hilles & Jones, Wilmington, Delaware.

The Theoretical and Practical Boiler Maker, 335 pages, and 37 lithograph plates. Published by the author, S. Nicholls, Yorkshire street, Blackpool, Eng and Mailed on receipt of P.O.O value $1.83, to Blackpool. See Review, AMERICAN MACHINIST, p. 8, July 22, 1882.

The *Sanitary Engineer* of Oct. 19, publishes with illustrations the report of Chief Engineer Durand Claye, of Paris, on the just completed Sewerage System of Berlin. It presents in each issue a great amount of matter of special interest to engineers, contractors, steam fitters and plumbers. If any reader of the AMERICAN MACHINIST who may now be buying the *Sanitary Engineer* of news dealers, will request it, the publisher will send him two weekly issues free if this advertisement is referred to. Address the *Sanitary Engineer*, 140 William street, New York. (P. O. box, 3037.)

MANUFACTURES.

The Brierfield (Ala.) Coal Company is preparing to erect a 200-ton coke furnace.

The pay roll at the Meriden (Conn.) Britannia shop for October, was $60,000, the largest ever known.

The Yale Lock Company, of Stamford, Conn., is preparing to erect an additional building 150 x 100 feet.

The Lamb Knitting Machine Company, of Chicopee, Mass., has been obliged to increase the size of its foundry.

The Steel works at Springfield, Ohio, are building a Siemens-Martin steel plant and a mill to roll the product.

The Zinc Company, at La Salle, Ill., are laying the foundation for another immense smelting furnace

The Saugatuck Iron Works is the name of a new stove foundry built at Westport, Conn., by M. L. Filley, of New York.

The new Clemens Foundry and Machine Co., Ansonia, Conn., is meeting with success and their castings are well liked.

The Schenectady (N. Y.) Locomotive Works have just received an order from the Canada Southern Railroad for thirteen locomotives.

The Everett Iron Company of Everett, Cambria Co., Pa., when its new works are completed, will give employment to several hundred men.

The Dayton Lock Works, Dayton, Ohio, which is organized with a capital of $80,000, for the manufacture of cabinet locks, will employ about 60 hands.

The Hartford Machinery Agency has been incorporated at Hartford, Conn., with $10,000 capital stock. George L. Chase owns the controlling interest.

George W. Dickinson, of Essex, Conn., is to erect a new brick factory for the manufacture of ivory and bone goods. The building is to be about 100x30 feet, and three stories high.

The Murray Iron Works Company, Burlington, Iowa, are just completing their new foundry, 200x135, and will at once make important changes and additions to their machine shop.

Dean Bros., steam pump makers, Indianapolis, Ind., are moving into the new addition to their shops and report business good. They have all the orders they can take care of, and will have to buy some new machinery.

Elmore, Sivyer & Co., manufacturers of malleable gray iron and brass castings, Milwaukee, Wis., are enlarging their malleable iron works. 75 hands are now employed and over 125 will be at work when the additions are made.

Smith & Burnham have purchased the Corning (N. Y.) machine shop and have fitted it up to manufacture any patented machine or tool that parties may desire to have made by the quantity. They will also build and repair engines, boilers, mill and elevator machinery.

The interest of the late William H. Abel in the extensive machine shops of Laconia and hosiery mills in Candia, N. H., together with various patents owned by the firm of Wm. H. Abel & Co., has been sold to Samuel Hodsdon, of Meredith, for $50,000.

Mr. Vinton, of the Vinton Iron Works, Indianapolis, Ind., reports his business first-class. He is crowded with orders, working every night, and says if his customers do not slack up on orders he will have to increase his facilities. Mr. Vinton is just bringing out a new hydraulic tile machine.

The Standard Tool Co., with a capital of $100,000, and backed by capitalists of Cleveland, Ohio, with W. A. Babcock, formerly with Morse Twist Drill Co., as general manager, has started the manufacture of twist drills and other fine tools, at Cleveland, O.

The articles of incorporation of the Wheeling, West Va., Steel Company have been filed; capital, $1,000,000. Ohio and West Virginia iron men are among the incorporators. Ground will be broken at once for one of the largest manufactories in the West.

Osgood & Macnaughton, Albany, N. Y., in addition to the foreign orders for nine of their steam excavators, recently reported, have just received an order for another to go abroad, this time to Mexico, making ten machines now under construction for export.

The shops of the Pittsburg, Cincinnati & St. Louis road at Pittsburg, Pa., are so crowded with work that the respective master mechanics are employing all No. 1 machinists who apply for work. It is expected that there will be plenty of work at all railroad shops through the winter.

The Cummer Engine Company, Cleveland, O., will commence to manufacture steam engines by Jan. 1. They are building and placing special tools in their new main building—23|x60, two stories—and are fitting the foundry building, 220x60, with two cupolas, cranes and necessary machinery.

F. Armstrong, Bridgeport, Conn., reports business good and that he cannot keep up with orders for stocks and dies, though several new milling tools have been added to his working plant. His new factory building now being erected will be 40x150 feet, 3 stories high. It is being equipped with the Lowe boiler and Greene engine.

R. W. Rexford, Philadelphia, is about to move his tool store from 11 N. 6th street to 17 N. 6th street, in order to get more room to accommodate the growth of his business. The new store is 70x18 and about 13½ feet high. It is shelved and closeted and has interchangeable drawers throughout. The arrangement is excellent.

The Buffalo Car Company has sold the Gilbert Car Works property in that city, amounting to $100,000. An order was entered November 14 in court authorizing the Gilbert Car Works to assume the new corporate name of the Buffalo Car Manufacturing Company. The order takes effect November 30.

George E. Brettelle, Rochester, N. Y., makes a specialty of building iron planers. At present he makes 36″×36″ and 30″×26″ planers to plane from 7 to 10 feet in length, as may be ordered, at the rate of five a month. He is about to increase his facilities and build larger planers. A ready sale has been found for all he has made thus far.

The Ingersoll Manufacturing Company, Stamford, Conn., Simon Ingersoll, President, began in April last the manufacture of the Ingersoll Excelsior Ratchet Drill, until recently manufactured by Sam'l C. Ingersoll, son of the inventor, Simon Ingersoll. They purpose putting up new works in the spring. They report a very satisfactory sale.

When the AMERICAN MACHINIST first started in November, 1877, among its first subscribers was the firm of Ebi & Neuman, Davenport, Ia. In renewing their subscription for the fifth time they write us: "As one of your old subscribers we can not do without the paper. Our business has increased fifty per cent. over 1881, and prospects are good for 1883."

The Billings & Spencer Co., Hartford, Conn., recently had a $2,000 fire, but everything is now going forward in the works as usual. They issue a circular to customers saying: "Owing to recent fire in our factory, we shall be delayed in our work for a few days. Your orders shall be filled and forwarded as soon as possible."

John H. Wright, Bridgeport, Conn., who has been announcing himself as manufacturing lathes and planers from Wood, Light & Co's patterns (in which shop he was formerly a contractor) has so materially improved and altered these patterns, that they are practically new patterns. Mr. Wright has special facilities for repairing Wood & Light tools, having many of the special jigs and tools which belonged to the old firm.

Notwithstanding their works burned down April 24th last, Lowe & Watson, Bridgeport, Conn., report their business in boilers and feed water heaters has been better this year than ever before. One month after the fire they were at work, partly in temporary quarters and partly out doors, with increased facilities. They moved into their new shops November 24th, and report orders plenty and prospects never better. The new shop is 64x88 feet with separate office building.

Most of the cheaper grades of pins made in this country, owing to the stress of competition, are made of iron, charcoal wire being the material used. J. S. Follansbee of Bridgeport, Conn., is making a machine for sticking the iron pins in the paper which overcomes the tendency to magnetization caused by the use of a conductor or conveyer in contact with the steel plates between which the paper is crimped in sticking. Mr. Follansbee's plan employs an endless chain instead of the old form of conveyer.

Diamond & Bogert, Flushing, L. I., have filled a number of orders for drop forgings and now have orders for 70,000 pieces from one concern. Besides this they have many orders booked for delivery in the near future. They are about to place upon the market full sets of wrenches made from Swedes Iron milled to fit the U. S. standard gauges for nuts. These wrenches are to be case hardened, and of the most approved proportions. This firm are about ready to furnish a full line of drop forgings, besides giving attention to all special orders presented them.

Holroyd & Company, Waterford, N. Y., advise us of considerably increased orders and inquiry for their stocks and dies during the past two weeks. Business and prospects good. This firm have recently purchased the steam fire engine manufactory of L. Button & Son, Waterford. They have already doubled the number of men employed, besides putting in a number of new machine tools. They expect to add other tools, and increase their force of men, besides putting up a new blacksmith shop. Messrs. Button remain in charge of the mechanical departments, as for many years past, but the business will be conducted by Holroyd & Co., under the style of the Button Fire Engine Co.

The Gage Machine Works, Waterford, N. Y., write us: While we have not as much work ahead of us as we had some months since, we are still very busy and are working entirely on orders, and have now more orders than at this time last year. We have made since January 1st, a large number of lathes, &c., including engine turret, speed, spinning and hand lathes, among which are eighteen swivel head brass lathes, 18″ swing by 5 foot bed for W. & L. E. Gurley, of Troy, N. Y., manufacturers of mathematical instruments, making eighty-two lathes of our make from this pattern now in their works. We have greatly improved our patterns and are now making all lathes with much heavier spindles, wider belt surfaces, and stronger feeds than formerly.

Grant & Bogert, Flushing, L. I., are now quite busy in building twenty-six 14-inch engine lathes, twenty-four of which are already sold They are also building six back-geared hand lathes, four of which are sold. In addition to the above they will soon commence work upon twelve 26 inch engine lathes, six of which are sold. These lathes where desired will have an entirely new head stock with twenty changes of speed, which is a novel and valuable feature upon this size of lathe. They are cutting large numbers of gears upon their new gear cutter, of which there are but four of the kind in the United States. Its capacity is to cut gears accurately of all diameters up to 7 feet and of any required pitch. This is a special branch of their business. Since the starting of their new foundry they have been enabled to push their work forward with greater dispatch.

The Ross Valve Company, Troy, N. Y., are meeting with good and increasing success in introducing their Pressure Reducer, for reducing the pressure of air, water, steam and gas, when conducted in pipes. Several large sized Reducers have recently been shipped to towns having water works under high pressure. By the use of this simple device the pressure of water in lateral pipes can be reduced to any desired extent. Orders are now being filled for reducing the pressure of gas from the natural gas wells of Pennsylvania. Steam fitters take very kindly to the introduction of the device for steam purposes, where less than boiler pressure is desirable. Considerable opposition, however, is met with on the part of plumbers against its introduction in small sizes to reduce water pressure in buildings, on account of its tendency to prevent the bursting of pipes, and correspondingly lessen plumbing bills, both for construction and repairs.

Machinists' and Engineers' Supplies.

NEW YORK, NOV. 30, 1882.

While the present state of trade in supplies cannot properly be called a depression, yet it is generally admitted that the market remains in a very quiet condition. We find that the principal complaints come from that class of manufacturers who have been building an inferior class of machinery and tools. Such individuals must necessarily suffer under the existing circumstances. The builders of first-class tools and machinery are all busy at present and we have thus far heard no complaints from them. Some of the dealers have already begun to take the customary account of stock preparatory to arranging their business and laying their plans for the next year. The manufacturers as well as the dealers continue firm in their views in regard to prices, and no immediate changes in this direction are probable.

Wrought Iron Pipe can be had at 62½ to 65 per cent. discount from list.

Iron and Metal Review.

There is at present only a moderate demand for Pig Iron and there has been a gradual falling off, in the consumption, repeated statements to the contrary notwithstanding. Consumers claim that they are buying at better prices now than for some time past. They still continue to follow their conservative policy and are not inclined to stock up as the future is regarded with uncertainty. The iron business in almost all departments is less active than it was at the same time last year.

We quote prices as follows: Foundry No. 1, $25 to $26.50. Foundry, No. 2, X, $23.50 to $24.50. Grey Forge, $20 to $21. The market for Foreign iron continues quiet while prices remain steady. Quotations in some instances are lower owing to a slight decline on the other side and lower ocean freights, since the cold weather came on. We quote Coltness $26.50 to $27; Glengarnock, $23 to $24; Gartsherrie, $26 to $26.50; Summerlee, $26; Carnbroe, $23.50; Eglinton, $22.50 to $23; Langloan, $26 to $26.50.

Wrought Iron Scrap is quiet at $28 to $28.50, from yard. Rails same as last reported. Bar Iron is generally weak. Structural Iron is quiet but firm. Copper continues quiet at 18c. to 18¼c. Banca Tin 28c.; Straits and Malacca 22½c. to 22⅝c.; Billiton 22½c.; Australian 22⅝c. to 22¾c. English Lamb and Flag 23c.; Spelter, Common Domestic 5c. to 5¼c.; Refined, 8c. to 8¾c.; Lead, 4½ to 4.5¢c.; Antimony, Hallet's, 10⅝c. to 10¾c.; Cookson's, 12⅛c. to 12⅜c.; Nevada 12⅛c.

WANTED

"Situation and Help" Advertisements, 30 cents for each seven words (one line) each insertion. Copy should be sent to reach us not later than Thursday morning for the ensuing week's issue.

Steam Users in want of First-Class Licensed Engineers can be supplied with reliable men. Address, Benj. F. Kelly, No. 20 Cortlandt St., New York. Agent for James Jenks' Duplex Injector and The Baragwanath Steam Jacket Feed Water Heater and Purifier.

A thoroughly practical machinist of 20 years' experience on general and first-class engine work, tools, pumps, locomotives, etc., will except a position as foreman or manager. Has had charge of from 6 to 250 men. Good references. Address, "Active," care AMERICAN MACHINIST.

A practical mechanic, at present holding a responsible position, will be at liberty January 1st and desires an engagement. Experienced in designing and constructing tools, fixtures, etc., for duplicate and interchangeable work, fine tools machinery, etc. Address, BOX 6, care AM. MACHINIST.

Wanted–Young man, graduate of technical school with good practical experience, who is willing to work into any specialty, desires to correspond with reliable parties, relative to any position where his acquirements will be of use. Unexceptional references. Address, E. M. G., 49 care AMERICAN MACHINIST.

Tool Builder Wanted.—The advertiser, who is building Iron Planers, Lathes and Drills (as well as being engaged in other lines of manufacture) desires to obtain a first-class practical tool builder to take charge of this department. One with some means, who would take an interest in the business preferred; an established business, good market and good prices. Apply for particulars, "Tool Builder," MACHINIST Office.

Foreman Machinist—Wanted an active, pushing man who is thoroughly competent and understands his business, as a practical machinist and foreman, for a shop in this city with about 30 men, and doing general variety of machine work. He must be strictly sober, have system in his work and be thoroughly familiar with the use of tools, a competent knowledge of men and their management. Permanent situation to the right man. Address, stating age, with full particulars as to experience as a foreman, qualifications, wages expected, and with references, E. J., care AMERICAN MACHINIST.

For Sale Cheap, Fly-wheel casting 10 feet by 18 inches, weight about 5,000. P. M. Sharples, West Chester, Pa.

COOKE & CO., Formerly Cooke & Beggs.
Dealers in MACHINERY AND SUPPLIES.
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The Waters Perfect Governor.

Having Adjustable Speed, Automatic Safety Stop, Sawyer's Lever, and Solid Composition Valves and Seats. Also

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Bus. Estab. in 1851. Incorporated in 1854.
BOURDON STEAM GAUGE
WITH LANE'S IMPROVEMENT.
IMPROVED
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36 Chardon Street, Boston, Mass.
Send for New Illustrated Price List and name this paper.
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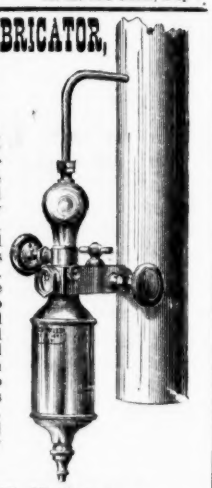
SWIFT'S AUTOMATIC LUBRICATOR,
MOST SIMPLE LUBRICATOR IN THE MARKET.



Contains no pipes inside, or glass tubes or pipes outside, to be disarranged or broken. Has a positive flash feed seen in a good light a distance of fifty feet. Body in one piece. All joints of metal, tested at a pressure of 160 pounds before leaving the works. Range of feed, from one drop in three minutes to one drop per second. All worn parts can be renewed at very slight expense. Will use dark or light oil. With ordinary care never fails to operate. Best of materials and best of workmanship. No leaky cocks. Invented by an engineer of twenty years' experience.
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ENGINES, BOILERS,
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Foot and Hand Power Machinery. Machinists' Hand Tools, &c., &c.
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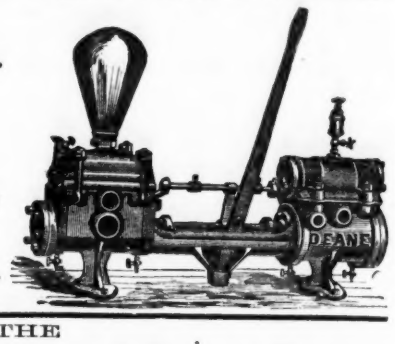

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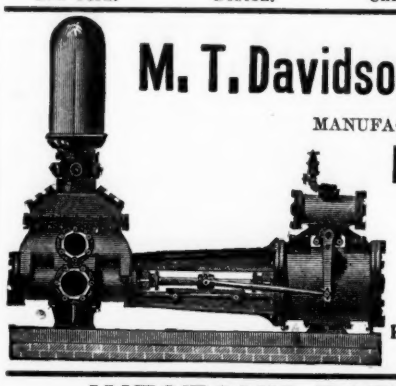

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Warranted the Best Pump made for all Situations.
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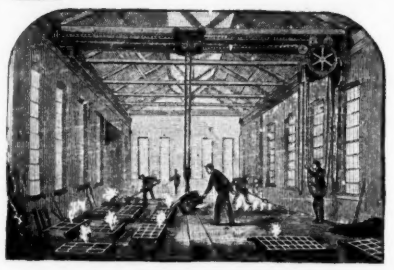

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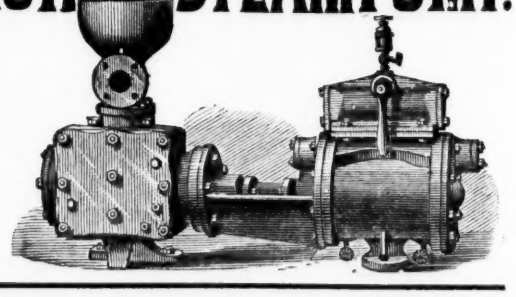

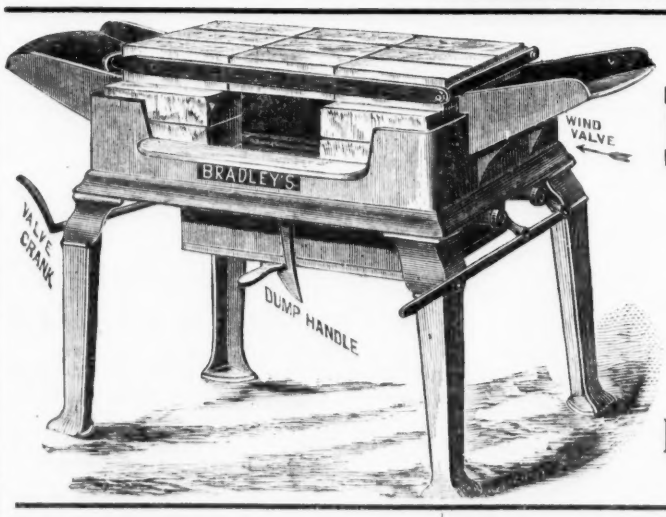

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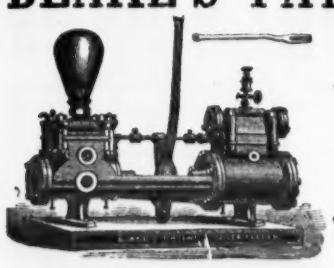

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Hollow Spindle, Improved Stop Motion, 14 in. Swing 4 to 8 feet beds.
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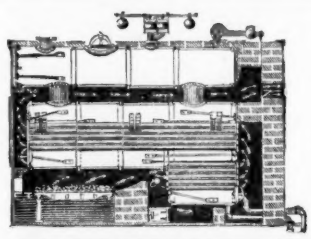
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CAN FURNISH YOU WITH A LARGE LINE OF MACHINE AND RAIL ROAD TOOLS.

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PATENT HOT POLISHED SHAFTING.
Superior to any shafting in market for the following reasons, viz.: 1st.—It is perfectly straight and round. 2d.—It can be rolled accurately to any desired gauge. 3d.—It has the beautiful blue finish of Russia Sheet Iron, rendering it less liable to rust or tarnish than shafting of the ordinary finish. 4th.—It will NOT SPRING or WARP IN KEY SEATING like most of the other manufactured shafting sold in the market, and, as a consequence, is admirably adapted for LINE AND COUNTER SHAFTING. 5th.—The surface is composed of MAGNETIC OXIDE OF IRON, forming a superior journal or bearing surface. 6th —It is made of superior stock.
Sizes made from ⅞ to 3½ inches, advancing by sixteenths. Price lists, with references and other information, furnished on application to
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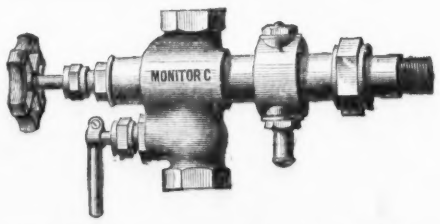

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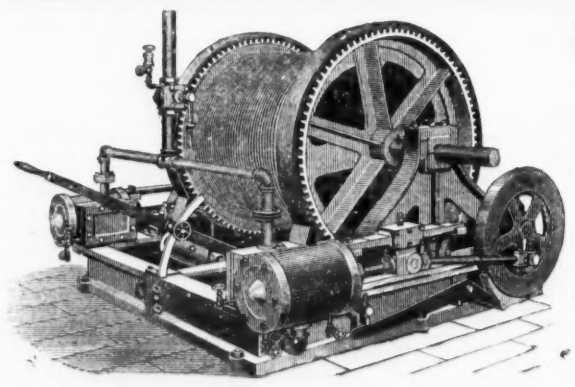
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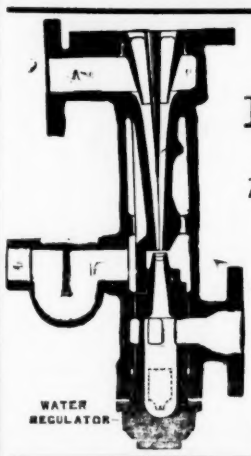

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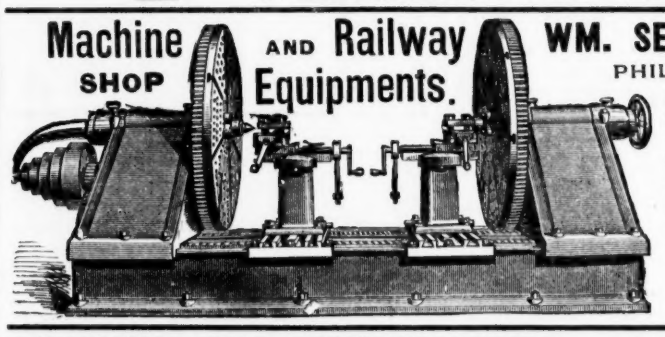
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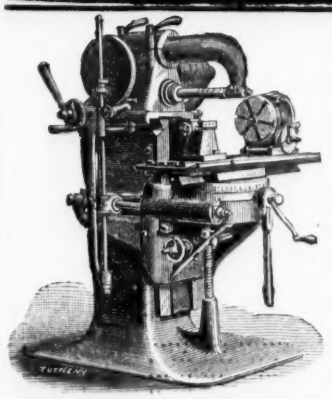
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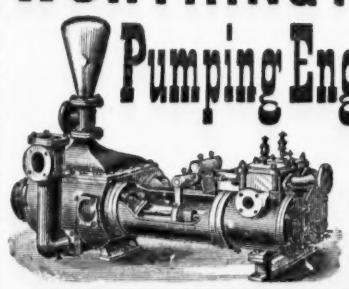
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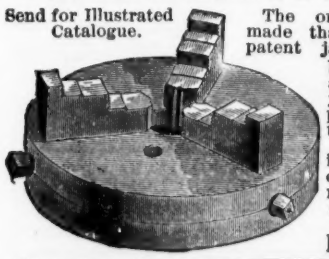

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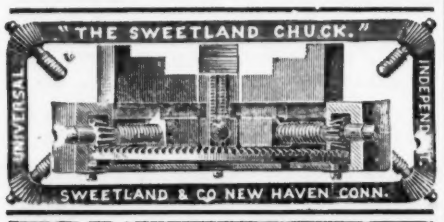

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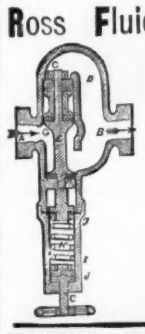

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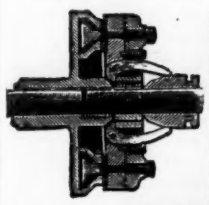

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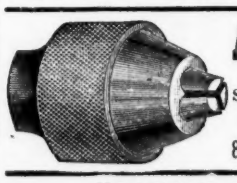

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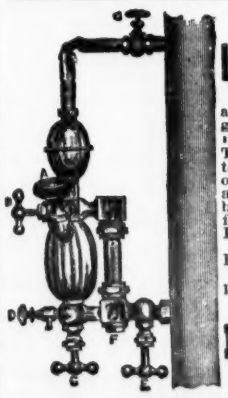

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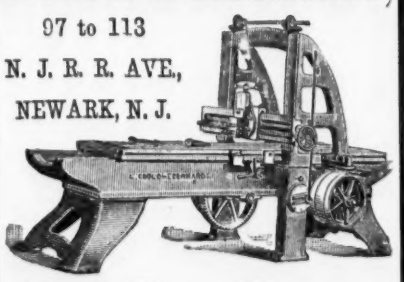

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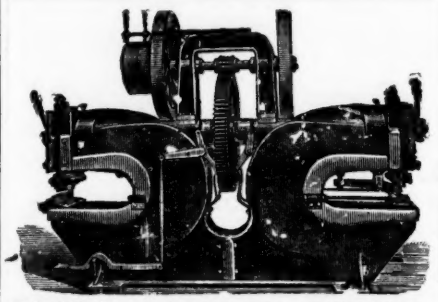

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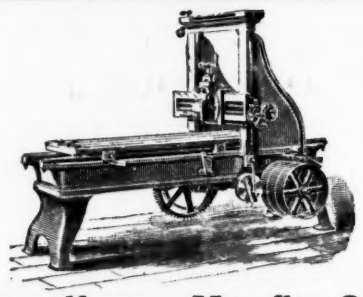

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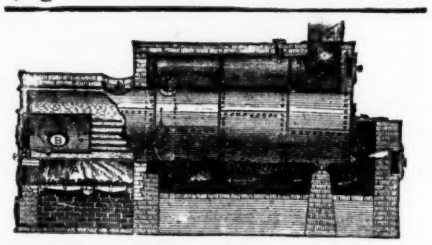

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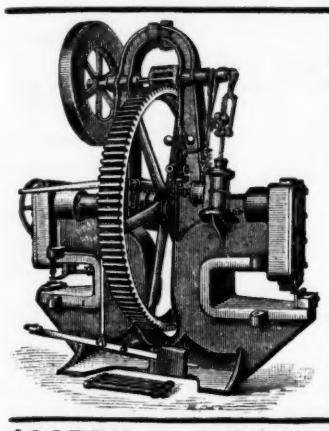

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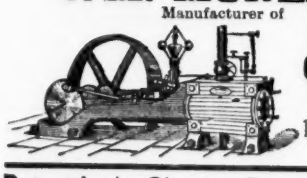

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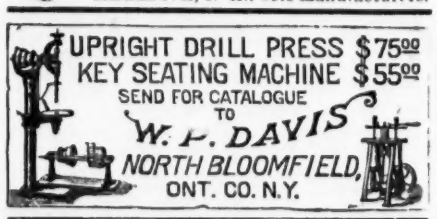

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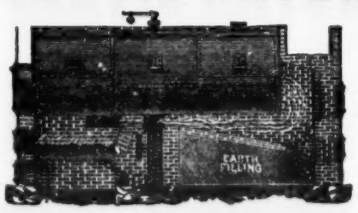

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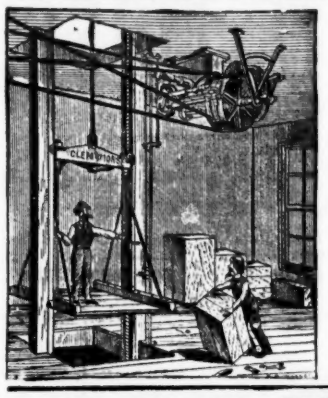

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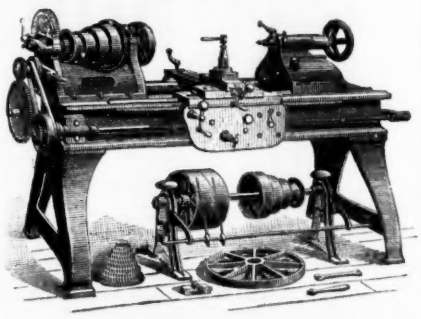

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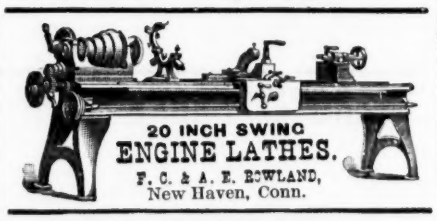

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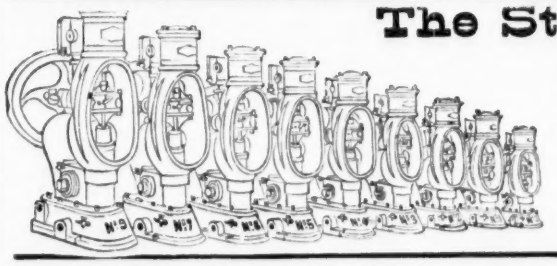

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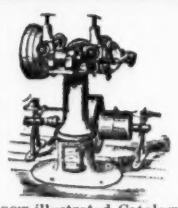

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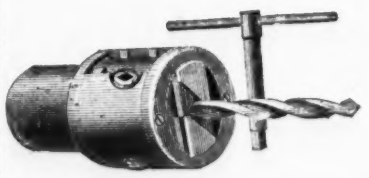

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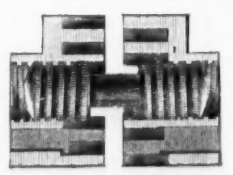

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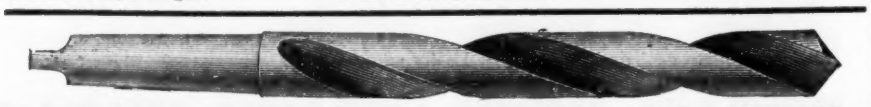

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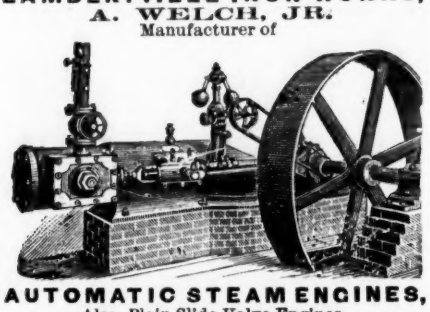

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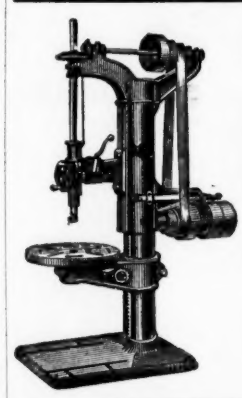

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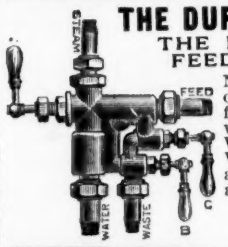

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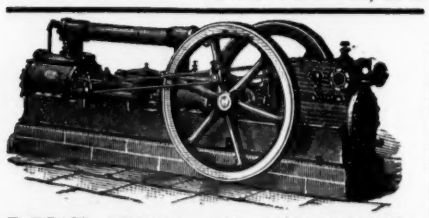

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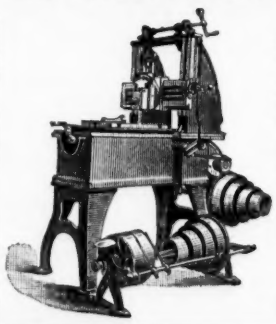

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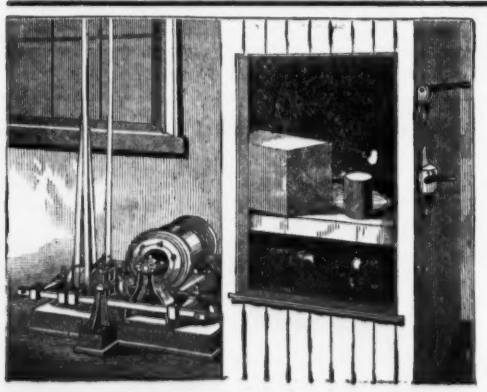

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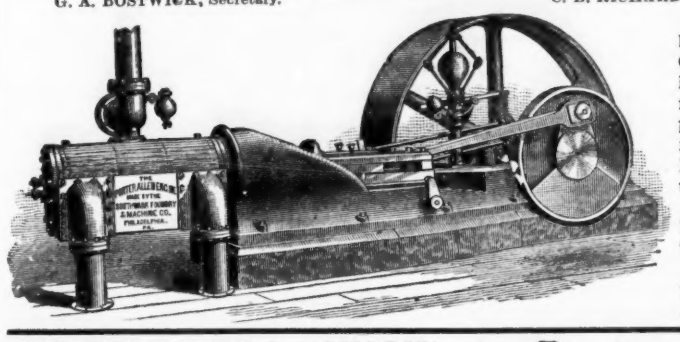

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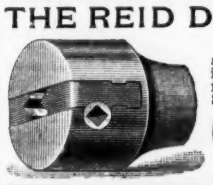

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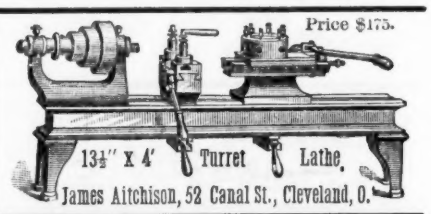

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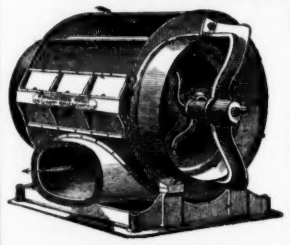

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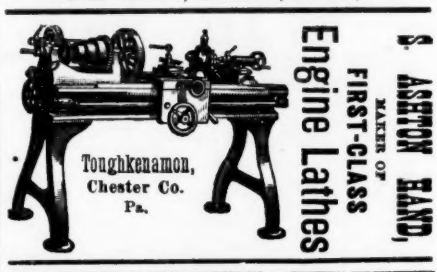

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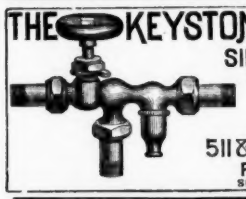

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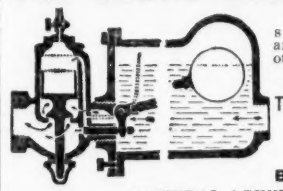

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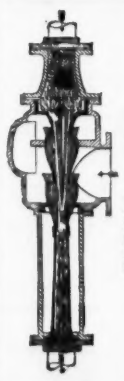

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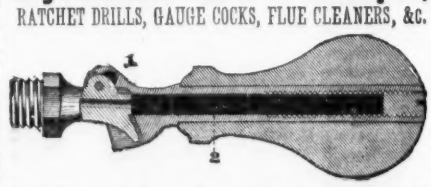

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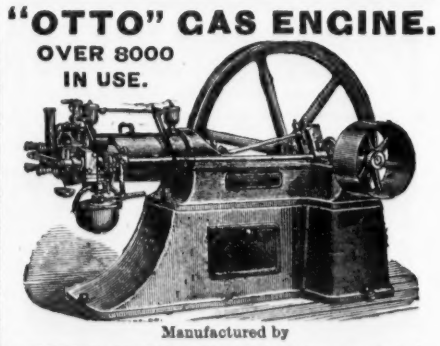

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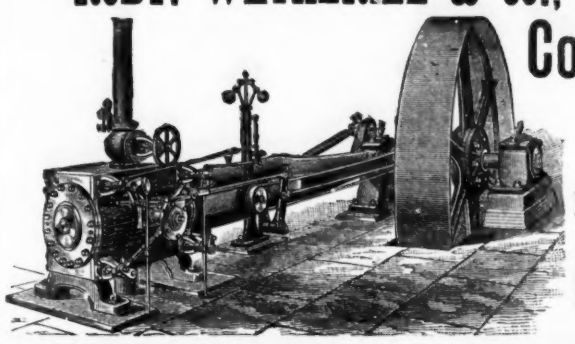

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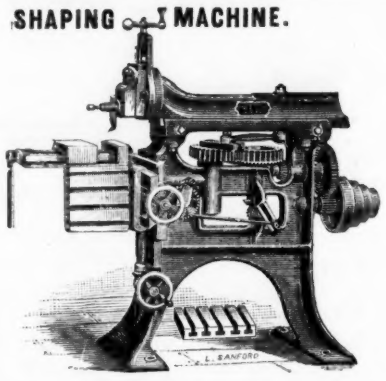

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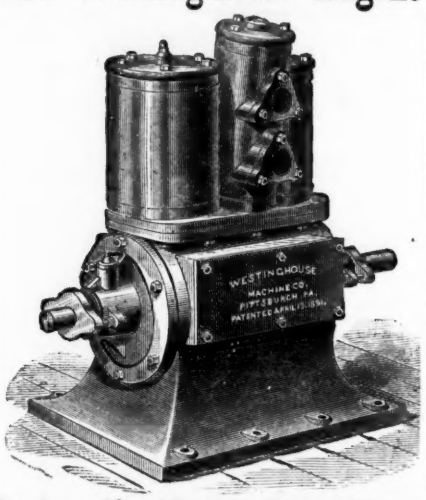

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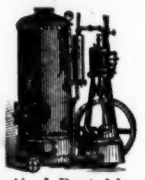

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Reliable, durable and economical. *will furnish a orse power with ⅓ less fuel and water than any other ngine built*, not fitted with an automatic cut-off. end for illustrated Catalogue c. c., etc. for information and prices. B. W. PAYNE & SONS,

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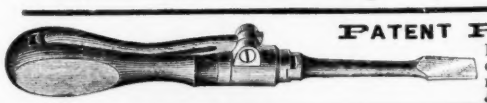

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guaranteed to excavate 50 per cent. more material from hard bottom than any other machine.

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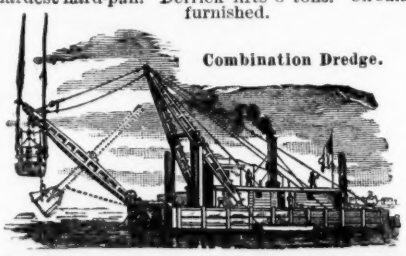
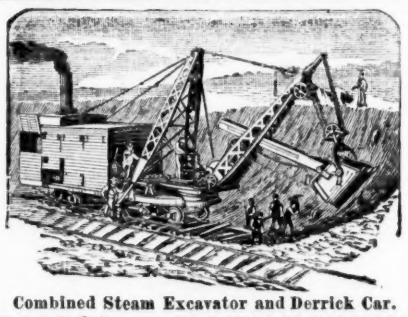
has a capacity of 4 cubic yards per minute in gravel. Has proved very efficient and desirable in the hardest hard-pan. Derrick lifts 8 tons. Circulars furnished.



Combination Dredge.



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Swivel Head Engine Lathes,

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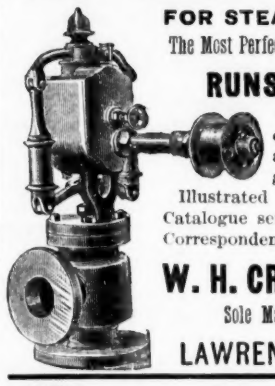

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Guaranteed to accurately regulate all classes of engines.

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Sole Manufacturers,
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NOV. 27, 1882.

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1 " " 26 in. x 12 ft. Grant & Bogert. [New.
1 " " 22 in. x 14 ft. " " New.
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1 " " 14 in. x 6 ft. Star Tool Co. New.
1 " " 15 in. x 6 ft. "
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1 " " 11 in. x 4 ft. & 5 ft. Prentiss. New.
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1 " " " 15 in. x 4 ft. New.
1 Fox Lathe, 15 in. x 5 ft. Am. Tool & Machine Co.
1 15 in. x 4 ft. Turret Lathe. Lodge & Barker.
1 Fox Turret Lathe, 16 in. x 6 ft. Lodge & Barker. New.
1 Planer, 38 in. x 38 in. x 8 ft. New.
1 " 16 in. x 14 in. x 3½ ft. New.
1 " 22 in. x 20 in. x 5 ft. "
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1 " 26 in. x 26 in. x 7 ft.
1 " 20 in. x 20 in. x 4 ft. Good order.
1 " 16 in. Lever Table Drill. New.
1 16 in. Upright Drill. " "
1 20 in. Upright Drill. Prentiss. "
1 24 in. " " Prentiss. "
1 30 in. " " " "
1 25 in. swing B.G. & S.F. Drill. Blaisdell. "
1 28 in. " " " " "
1 15 in. Shaper. Gould & Eberhardt.
1 10 in. Shaper. Gould & Eberhardt. New.
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1 9 in. Shaper Hewes & Phillips. "
Full assortment Milling Machines, Spindle Drills, &c., of Garvin's. New.
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PROMPT DELIVERY.

One 12 inch Cylinder. 36 inch Stroke. At once.
One 14 " 36 " In two weeks.

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MACHINERY.

90 inch	Swing,	20 foot	Bed,	Engine Lathe.	2d hand.
43	"	11	"	"	New
23	"	16	"	"	2d hand
22	"	8	"	"	"
21	"	6	"	"	"
20	"	8	"	"	"
20	"	6	"	"	"
19	"	7	"	"	"
18	"	7½	"	"	"
18	"	6	"	"	"
17	"	6	"	"	"
16	"	6	"	"	"
15	"	6	"	"	"
14	"	6	"	"	"

Large list of New Lathes. Various sizes and lengths.

50 inch x 50 inch x 16 foot					Iron Planer.	2d hand.	
36	"	36	"	9	"	"	"
56	"	56	"	16	"	"	2 heads. New.
38	"	38	"	12	"	"	" "
72	"	72	"	26	"	"	4 "

Large list other sizes, new.
Shapers, Drills, Bor'g Mills, Cutting-off Machines, &c.
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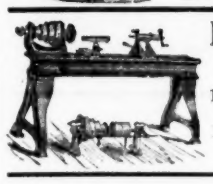
Extra Heavy 16 inch HAND LATHES.



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DEXTER, Me.
Send for description.

New & Second-Hand MACHINERY.

Nov. 27, 1882.

The following New and Improved Machinists Tools are part of what we have for early delivery

1 60 in. swing 24 ft. bed. Engine Lathe. Dec. 1.
1 42 in. " 20 ft. " " " " 1.
1 36 in. " 18 ft. " " " " 15.
1 36 in. " 14 ft. " " " " 15.

The following on hand:

1 New Corliss Engine. 12″ x 36″. Complete.
1 42 in. swing, 16 ft. bed, New Engine Lathe.
1 30 in. " 18 ft. " " " "
1 30 in. " 16 ft. " " " "
1 30 in. " 14 ft. " " " "
1 22 in. " 12 ft. " " " "
4 18 in. " 8 ft. " " " "
5 15 in. " 6 ft. " " " "
1 10 in. " 5 ft. " " " "
1 30 in. " 12½ ft. "
1 26 in. swing, 14 ft. bed.
1 13 in. swing, 6 ft. Hand Lathe. New.
1 10 in. " 4½ ft. Bed Hand Lathe. New.
1 38 in. x 12 ft. Iron Planer. New.
1 38 in. x 10 ft. " " "
1 32 in. x 8 ft. " " "
1 26 in. x 6 ft. " " "
2 30 in. x 8 ft. " Planers. "
2 22 in. x 4 ft. " " "
2 38 in. Swing Upright Drills. B. G. & S. F. New.
1 23 in. Drill. B. G. & S. F. New.
1 22 in. " Upright Drill. B. G. S. F. New.
1 23 in. " Plain.
3 20 in. " "
1 18 in. Bench Drill.
1 4 spindle Drill. New.
1 3 " " "
2 4 " " Second-hand.
1 12 in. stroke Slotting Machine. New.
2 12 in. Shapers. New.
2 15 in. " "
2 12 in. stroke Shapers, traveling head, 40 in traverse double tables. New.
1 6 in. stroke Hand and Power Shaper, with Counter-shaft.
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1 Sellers Milling Machine. 2d-hand.
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One Special Shafting Lathe, 26 inch swing, 25½ foot bed, to take 20 feet between centers.

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Send for List and state what Tools you want.

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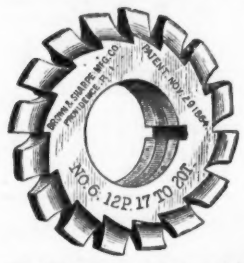

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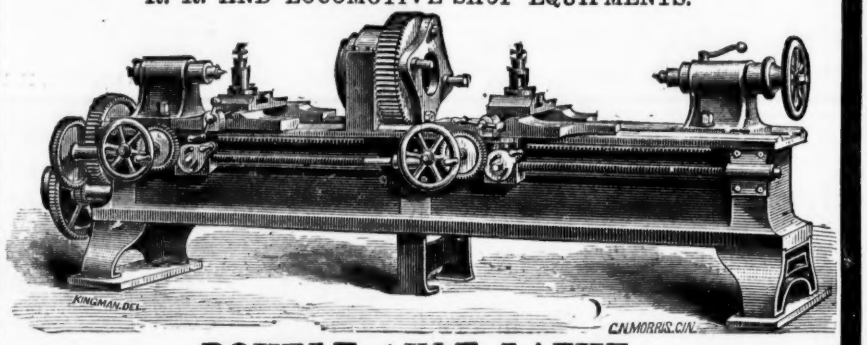

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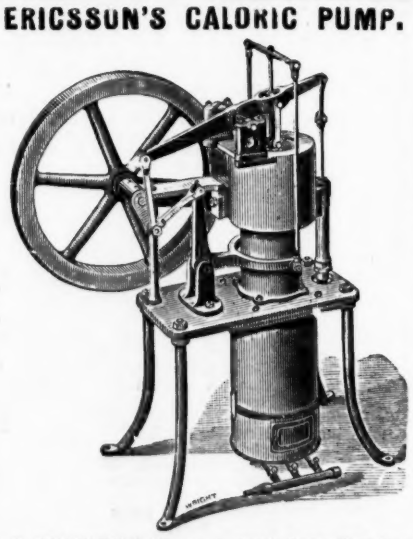

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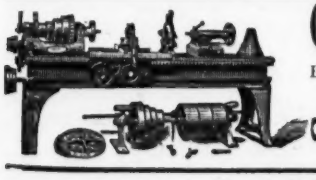

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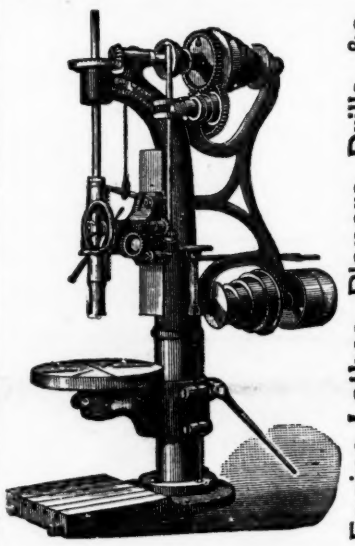

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1 22 in. Upright Drill Press, F. E. Reed.
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